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In THE MUNICIPAL INDEX AND ATLAS (the annual reference volume of data and condensed catalogs published by the American City Magazine Corporation) readers will find statistical material, and articles on a wide variety of municipal and public works subjects, not published in the monthly issues of the magazine.

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In BROWNSVILLE, Texas

Brownsville, Texas from the Air.

Air View, Port Brownsville Turning Basin.

Canal Taking Water to Brownsville's Water Plant.

View of Airport.

Filtration Plant.

Located at the southern tip of Texas on the Rio Grande River, twenty-five miles from the Gulf of Mexico, Brownsville, Texas is the largest city in the rich Lower Rio Grande Valley.

From this rich valley comes the entire supply of Texas' grapefruit and oranges and much of its winter vegetables. However, citrus production is but one of Brownsville's trades—canning plants, bulk oil stations and a number of factories making palm leaf hats, farm children's dresses, men's work clothes and novelties ship their products over a wide area.

As a key point in the transportation scheme between the Americas, Brownsville is a railway port of entry, has a fine network of paved roads and is the northern terminus of Pan American Airways Western Division. Its transportation picture was completed when the Port of Brownsville was opened, making the city a seaport. This man-made channel, 17 miles long, terminates in a mammoth turning basin that makes a perfect land-locked harbor.

We are justly proud of the fact that Pittsburgh Water Meters are found accurately measuring Brownsville's water supply. Water is pumped from the Rio Grande River to a 7 million gallon raw water reservoir, then filtered and treated in a modern filtration plant before it is supplied to the citizens.

PITTSBURGH EQUITABLE METER COMPANY

MERCO NORDSTROM VALVE CO.

NEW YORK · BUFFALO · PHILADELPHIA
KANSAS CITY · TULSA · LOS ANGELES

Main Offices - PITTSBURGH, PA.

DES MOINES · CHICAGO · COLUMBIA
MEMPHIS · OAKLAND · HOUSTON

PITTSBURGH WATER METERS

Why not remember to mention THE AMERICAN CITY?

To Our Friends, the Taxpayers' Leagues:

Balancing Tax Burdens Against Tax Benefits

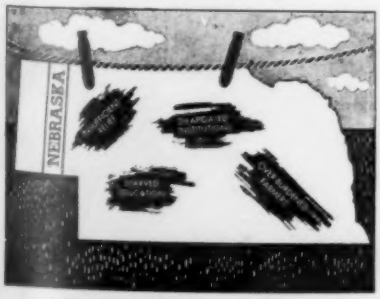
TO the growing host of taxpayers' organizations throughout the United States, THE AMERICAN CITY extends greetings and offers a friendly hint.

You would more surely advance the public welfare, gentlemen, if you would give emphasis—as does the New Jersey Taxpayers Association in the accompanying statement, "Taxes Are Both Food and Poison"—to the *benefits* and not merely the *burdens* of taxation. And you would render added public service by enlightening your members as to the comparative economic and social effects of different kinds of taxation.

Your directors recognize the fact, of course, that ability to maintain a high level of state and local governmental services depends on a high level of general prosperity; but the corollary is sometimes ignored—that a high prosperity level cannot be maintained if essential governmental functions are starved by reckless budget-slashing.

Consider Nebraska, for example. Persuasive propaganda and paid publicity have been proclaiming that state as "America's White Spot" on the nation's tax map, and as a haven for tax-ridden industry. But the October number of *Survey Graphic*, just published, carries an 8-page article by Farnsworth Crowder from which it appears that the white spot is actually discolored by some rather ugly stains. In the important field of education, for example:

"Nine years ago, Nebraska school salaries, already lean, started down grade until they were 28 per cent under the 1929 high. This was, with Oregon, the largest percentage reduction suffered by the public educators of any state. The average annual salary of teachers, supervisors and principals in Nebraska (data as of November, 1937) was $772—$511 under the national average; lower than in any state, except the two Dakotas and seven in the Deep South."



STAINS ON AMERICA'S WHITE SPOT
Cartoon by Pictorial Statistics, Inc., from the cover of *Survey Graphic* for October, 1938

Grossly inadequate relief provisions, antiquated public buildings, and incompetent institutional care, are among other shortcomings charged in the *Survey Graphic* article. "The story of the state's juvenile courts is heartbreaking; the story of its poorhouses pitiful and infuriating."

Leaders in Nebraska are increasingly asking whether the adequacy of governmental services can be measured only in terms of dollars saved. As Mr. Crowder points out, "A man may save by never visiting a dentist, but he may also die of abscess infection."

To sound such a warning is not to discount the admittedly effective work which the Nebraska Federation of Taxpayers' Leagues has done in studying local budgets and in effecting substantial reductions in wasteful expenditures. Such work is much needed in many municipalities and in most counties throughout the United States. But this does not mean that the food must necessarily be thrown out with the poison.

Who Pays the Taxes?

OF as great or perhaps greater importance than the total tax burden in any community is the apportionment of that tax burden among individuals. If we are to attain and maintain a high level of general prosperity, taxation must not bear oppressively either on business enterprise or on the low-income groups. It makes a big difference to the mechanic or the stenographer or the retail merchant, for example, whether public revenues come from an income tax which has some fair relationship to ability to pay, or from a sales tax which bears much more heavily on the poor man's wages than on the rich man's plenty. And it makes a big difference to the home owner and to the construction industry whether the property tax takes a smaller ratio of building costs than of land costs, or whether the tax bears so heavily on buildings and improvements as to discourage home construction and betterment. Of importance also are equitable assessments and freedom from favoritism in tax abatement.

To our friends among the taxpayers' leagues and others who are helping to determine tax policies, local or national, THE AMERICAN CITY commends the monthly service and annual publications of the Tax Policy League, obtainable at a combined cost of only $5 per annum. This organization, whose policies are determined by a Board of Directors and Advisory Council of about fifty outstanding economists, tax officials, educators, and business and civic leaders, has issued a statement of its principles and a list of its publications in a "Tax Information" leaflet, which may be had for the asking from the League's headquarters at 309 East 34th Street, New York.

TAXES ARE BOTH FOOD AND POISON

TAXES feed, clothe and shelter the poor. They build, operate and maintain hospitals, infirmaries and orphanages. They care for the living and bury the dead. They provide county agents and nurses and pay for fairs and football.

TAXES maintain schools and colleges. They provide transportation, pencils and books. They furnish laboratories, libraries, museums, parks, playgrounds and zoos. They build roads and sewers, sidewalks and swimming pools. They remove snow, put out fires, regulate hairdressers and control wife beaters.

TAXES provide police and prisons, armies and navies. They give security and safety to persons and property. They furnish courts and justice. They protect commerce and trade, deepen rivers, regulate freight and power rates. They supervise banking and business and provide inspection of milk and meat, weights and measures, fabrics and factories, workmen and wages.

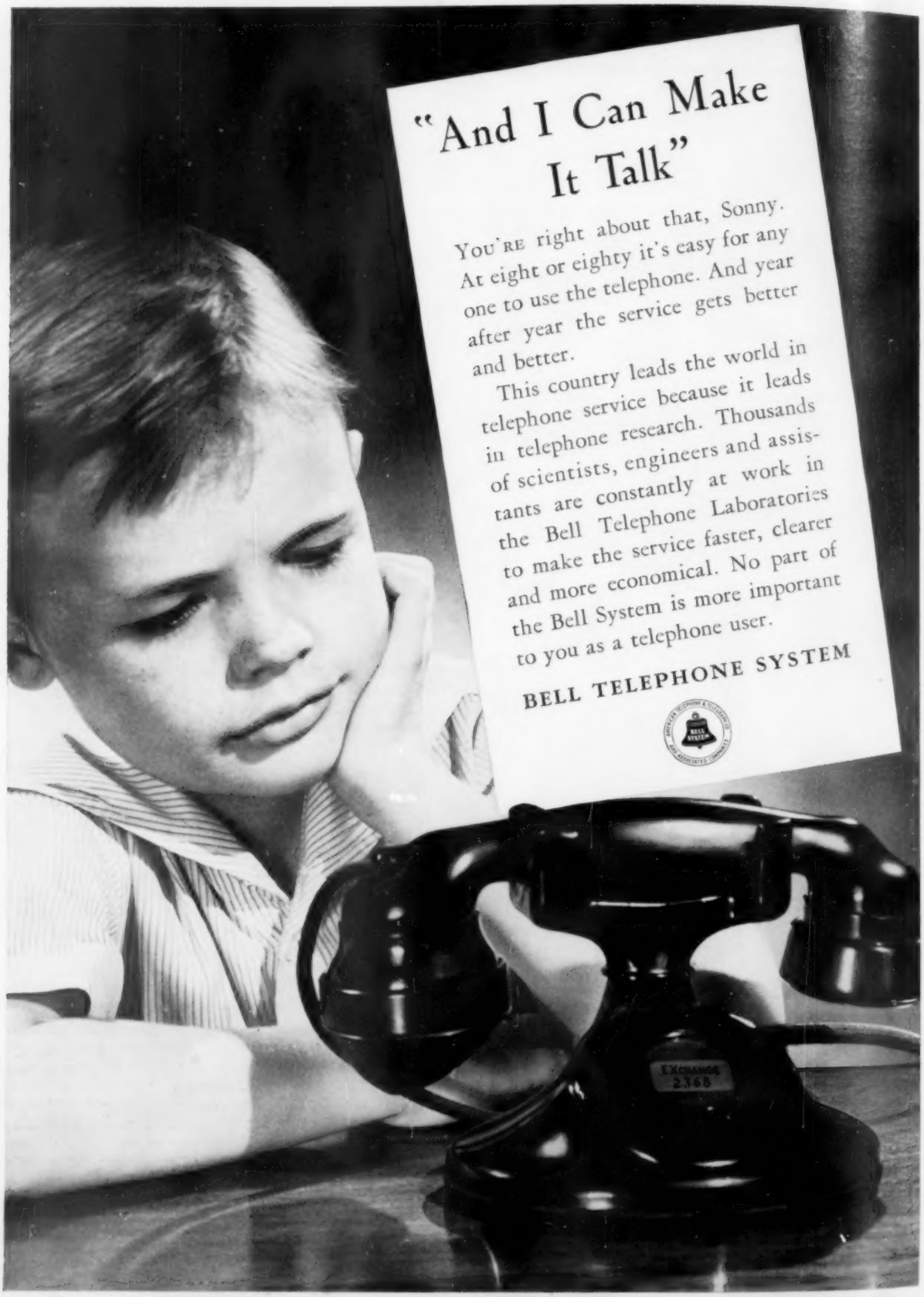
GOVERNMENTS ARE EXPANDING THEIR SERVICE TO COVER EVERY SOCIAL, CULTURAL AND ECONOMIC ACTIVITY AND RELATIONSHIP

TAXES MAY ALSO

Take the widow's home	Wreck commerce
Drive the farmer off his land	Kill initiative
Close the factory	Disrupt production
Penalize the industrious	Jeopardize inheritances
Ruin the businessman	Overthrow governments
Confiscate savings of the frugal	Destroy civilizations

TAXES, LIKE FIRE, MAY PROVIDE POWER AND ENERGY AND GIVE WARMTH—BUT IF NOT KEPT IN BOUNDS AND CONTROLLED THEY MAY CONSUME AND DESTROY. WE NOW APPROACH THIS DESTRUCTIVE PHASE.

FROM THE FRONT COVER OF THE SEPTEMBER 15, 1938, ISSUE OF *TAXEGRAM*, THE BULLETIN OF THE NEW JERSEY TAXPAYERS ASSOCIATION


"And I Can Make It Talk"
You're right about that, Sonny. At eight or eighty it's easy for any one to use the telephone. And year after year the service gets better and better.
This country leads the world in telephone service because it leads in telephone research. Thousands of scientists, engineers and assistants are constantly at work in the Bell Telephone Laboratories to make the service faster, clearer and more economical. No part of the Bell System is more important to you as a telephone user.
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EXCHANGE 2368

Your good telephone service is made possible by the constant research of Bell Telephone Laboratories

Do you mention THE AMERICAN CITY? Please do.

Our Municipal Notebook

Better Transit Teamwork

THREE years ago the football of local transportation was used by two teams, the one consisting of the operators, the other of the municipal officials, the public, a huge debt, obsolete facilities, and a proverbial unpopularity. Since then, in the opinion of this magazine, there has been some progress made toward getting municipal officials to examine the point of view of the men who are responsible for the actual operation of the transportation systems.

THE AMERICAN CITY, which has devoted much time and thought to this field, wrote as follows to a number of its regular subscribers: "To do this job well takes space, energy and enthusiasm. Is it worth doing? Is the subject live enough? Are *you* interested?

The resulting response, practical and constructive, amounts to a public demand for information about urban transportation.

Minneapolis Business Men Want Parking Meters

THE fourteen Minneapolis business and civic groups listed below have by formal resolution asked the City Council to consider a test of 1,000 or more parking meters to cover the entire loop district: Minneapolis Retailers Association; Building Owners & Managers Association; Central Properties; Minneapolis Real Estate Board; Twin City Garage Owners Association; Department of Government of Minneapolis Civic and Commerce Association; Commonwealth Club; Junior Civic and Commerce Association; Hennepin County Medical Society; Council of Civic Clubs; Hennepin County Dental Society; Minneapolis Automobile Club; Minneapolis Hotel Owners Association; Property Owners Association.

The Bulletin of the Minneapolis Civic and Commerce Association describes the operation of parking meters and summarizes the results of a questionnaire answered by 43 cities using them. Here is a summary of the summary:

Double Parking	Number of Cities
Eliminated	19
Practically eliminated	17
Reduced	7
Traffic Congestion	
Greatly relieved	26
Relieved	15
Fair reduction	1
No change	1
Complaints from Motorists	
None	19
Few	24

96% of All Alarms Sent by Fire Alarm

AS showing how a modern fire-alarm system can be used, A. Y. Cottrell, Superintendent of Alarms of Lenoir, N. C., states that although prior to installation of the new alarm in 1936 all alarms were received by telephone, since then 96 per cent of all fire alarms have come over the fire-alarm system, apparently because of keen local interest in adequate notification, and present policy is to install four new boxes annually. Every fireman's home has or will have a 6-inch turtle gong. An automatic switch turns all traffic lights red when the apparatus needs the right-of-way. What is the result? Falling fire losses as follows: $96,000 in 1932; $42,000 in 1933; $45,000 in 1934; $7,387 in 1935; in 1936 the damage was $64,800 ($50,140 of which was one plant located in a district without adequate water supply); $17,048 in 1937; $5,435 to June, 1938. "Our expenditure for the fire-alarm system and equipment," says Mr. Cottrell, "has been amply justified."

Don't All Come at Once

THE central business districts of the cities of Washington, D. C., Columbus and Toledo, Ohio, Norfolk, Va., and Spokane, Wash., have curb parking spaces for 21,394 cars, or one curb space for 62 citizens, according to some figures compiled by the A.A.A. Committee on Parking and Parking Terminals. At this rate, all the 16,598 incorporated places of the county can accommodate in their business districts 1,130,000 cars at one time. With a turnover of 5 cars, these spaces can take care of 5,650,000 vehicles, or about a fifth of the number registered in this country. Fortunately, they do not all come to town at once, even on Saturday night. Parking meters have the effect of holding the parking to one car per 20-foot space and directing the overflow to adjacent streets.

Street Relighting Pays

RELIGHTING sections of 14 streets reduced the number of accidents 10 per cent for the entire city of Hartford, Conn., and 46 per cent on the streets actually relighted—77 fewer property-damage accidents, 95 fewer injury accidents, no fatalities. Increased annual cost amounts to 16 cents per foot of these streets. (See pp. 55 and 125.) Street lighting can be improved until the number of night accidents is comparable to those by day.

A Correction

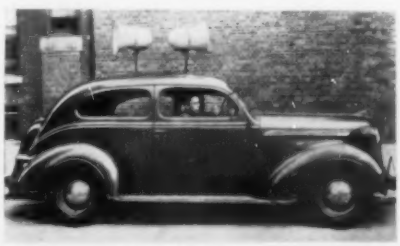
IT was stated here last month that the American Automobile Association released on August 3 a long review of the comprehensive statistical report on Parking Meters made by the New York Bureau of Municipal Information, Albany. This statement was erroneous, as this press release was prepared and issued by Editorial Research Reports, 1013 13th Street, Washington, D. C.

Luminous Store Fronts of Structural Glass

THROUGH a greater use of structural glass, which can be lighted from behind and is adaptable to sandblasted designs, the main streets of America may receive a general face-lifting in the next decade that will put the present unsightly signs and confusing lights into the obscurity now enjoyed by the cigar-store Indian and the barber pole.

"Lights will stream softly through colored glass façades," said H. M. Alexander, architect of the Libbey-Owens-Ford Glass Co., to the illuminating engineers of Minneapolis, "and the after-dinner shopper walking along the street will sense a feeling of repose. Structures such as the town hall, library and fire house will be bathed in a flood of colored light. The 'Main Street of Tomorrow' will present the shopper or visitor with an arresting and yet tasteful spectacle because the architecture of the stores and offices will have a common denominator and will constitute a streamlined advertisement of the goods or services obtainable inside."

Luminous storefront areas, better street lighting and improved traffic conditions transform a commonplace business street into a street of pleasure and profit.



Courtesy of Wholesale Radio Service Co., New York.

FLEXIBLE PUBLIC ADDRESS SET

Did you know that these loud-speakers with amplifier case containing tubes and phonograph turntable can not only be operated by the car battery but can be picked up and taken into a room and plugged into a 110-volt circuit. The horns can be bolted to the roof as shown or project out of the car windows

The Morse Filter Plant

ADVANTAGES:

1 All-steel construction offers the same advantages that have proved so desirable in large capacity water storage tanks. No seepage, no cracking, less maintenance expense.

2 Economical in first cost. Requires less ground space per unit of capacity than any other type of construction. A 5-m.g.d. unit, for example, measures only 100 ft. in diameter.

3 Modern. Definitely designed to push obsolescence as far into the future as possible. Rapid sand type filter bed. Operating records reveal remarkable ease with which consistently satisfactory effluent can be maintained.

4 Flexible in both operation and application. Put in capacity needed at present; add more capacity easily and economically at any time in future. Standard designs are available for units ranging from 250,000 g.p.d. to 30,000,000 g.p.d.

5 Lower operating costs. Very small loss of head through plant means less pumping cost. Cleaning and maintenance is easier and quicker.

The Morse Filter Plant installation illustrated above was recently placed in operation at Bristol, Conn. The upper picture shows a general view of the complete unit, with two 400,000-gal. filtered water storage tanks in foreground. The lower view shows the interior of the Morse filter unit. Address our nearest office for information.

CHICAGO BRIDGE & IRON COMPANY

Chicago.....2127 Old Colony Bldg.
New York.....3308-165 Broadway Bldg.
Cleveland.....2236 Rockefeller Bldg.
Detroit.....1501 Lafayette Bldg.
Philadelphia..1616 "1700" Walnut St. Bldg.
Boston.....1501 Consolidated Gas Bldg.
Birmingham.....1502 N. Fiftieth Street
Dallas.....1406 Liberty Bank Bldg.
San Francisco.....1033 Rialto Bldg.
Houston.....2919 Main Street
Tulsa.....1625 Hunt Bldg.
Los Angeles.....1403 Wm. Fox Bldg.

Fabricating plants in CHICAGO, BIRMINGHAM, and GREENVILLE, PA.

Water Supplies and Water Rates

THE EAST JEFFERSON TANK DURING CONSTRUCTION

A Sign of Progress—New Tank Grows

DRIVING along the Old Spanish Trail westward from New Orleans, toward the Mississippi River Bridge, observing motorists noted this past spring the steel columns and then the shell of a huge elevated tank rising back of the modern filtration plant and pumping station of the East Jefferson Water Works District No. 1, in Jefferson Parish, just beyond the city limits of New Orleans. In an interview with J. W. Hodgson, President, and A. J. Wegmann, Treasurer-Manager, of the East Jefferson Water Works, we learned that this tank is to make the operations of the plant more economical, through making it possible to have a greater storage capacity and reduce the pumping operations about ten hours per day. Heretofore, the service pumps have operated continuously to furnish the average daily consumption of 1,100,000 gallons of water. With the 500,000-gallon tank recently completed by the Chicago Bridge and Iron Co., additional fire protection is available, and the monthly electric power bill is reduced through this medium of economical operation. An entirely new intake works and pump-house has just been completed; this too, as a means of reducing operation costs and increasing the daily capacity of the plant. Through these means, the plant has looked forward for thirty years. In addition, the District has installed fifty additional fire hydrants throughout the area served, as a means of adequately protecting the buildings, homes and industrial plants of the community. In all, there are now 750 hydrants proportionately set to give fire protection to all improved property in the district.

The District also has a 100,000-gallon tank in the most distant section of Kenner, which also floats on the line and aids in maintaining a uniform pressure throughout the system. The district serves between 12,000 and 15,000 people through 3,000 metered services, and maintains 122 miles of cast iron mains, varying in size, from 20-inch to 6-inch. The plant is equipped with modern electric pumps and has two additional fire pumps and fuel oil diesels for emergencies and standbys. The capacity of the plant is now five million gallons of water per day.

T. R. K.—835.

The Present Status of Public Water Supply

EIGHTY million people in the United States obtain drinking water through more than 10,000 public water-supply systems. Approximately 37,000,000 of them use filtered and chlorinated water; 26,000,000, partially purified water; and 17,000,000, untreated water.

Most of the cities with populations of more than 5,000 are served by public water-supply systems. Approximately 14,000,000 people live in communities of less than 5,000. Many of these communities are still dependent chiefly upon private wells and cisterns supplying unsafe water. The problem of providing an adequate and safe water supply in semi-rural and suburban areas is one of outstanding importance. A successful approach to the solution of a similar problem is being made in England, largely through subsidies by the Central Government.

—From Section V of the February, 1938, Report on Drainage Basin Problems and Programs of the Water Resources Committee of the National Resources Committee.

Water-Rate Schedule in Holland, Mich.

THE new water-rate schedule of Holland, Mich., which became effective July 1, 1938, is interesting because of its completeness, including as it does a general water rate, a fire-hydrant rate and a street-sprinkling rate chargeable to the city, a sewer-flushing rate chargeable to the city, and a rural water rate, as follows:

General Water Rate:	
First 50,000 cu. ft. used quarterly, per 100 cu. ft.	$ .11
Next 50,000 cu. ft. used quarterly, per 100 cu. ft.	.10
Next 50,000 cu. ft. used quarterly, per 100 cu. ft.	.09
All over 150,000 cu. ft. used quarterly, per 100 cu. ft.	.07
Quarterly minimum charges for water service are based on the size of meter used, and are as follows:	
⅝" meter	1.50
¾" "	2.00
1" "	3.50
1½" "	5.00
2" "	8.50
3" "	17.50
4" "	25.00
6" "	35.00
Prompt payment discount	10%
Fire Hydrant Rate:	
Per year per hydrant	40.00
Street Sprinkling Rate:	
Total annual charge	1,200.00
Sewer Flushing Rate:	
Quarterly charge per service	4.00
Rural Water Rate:	
First 1,000 cu. ft. used quarterly, per 100 cu. ft.	.30
Next 49,000 cu. ft. used quarterly, per 100 cu. ft.	.20
Next 50,000 cu. ft. used quarterly, per 100 cu. ft.	.18
Next 50,000 cu. ft. used quarterly, per 100 cu. ft.	.16
All over 150,000 cu. ft. used quarterly, per 100 cu. ft.	.07
Quarterly minimum charges for water service are based on the size of meter used, and are as follows:	
⅝" meter	3.00
¾" "	3.50
1" "	5.00
1½" "	7.50
2" "	12.75
Prompt payment discount	10%
3" "	26.25
4" "	37.50
6" "	52.50

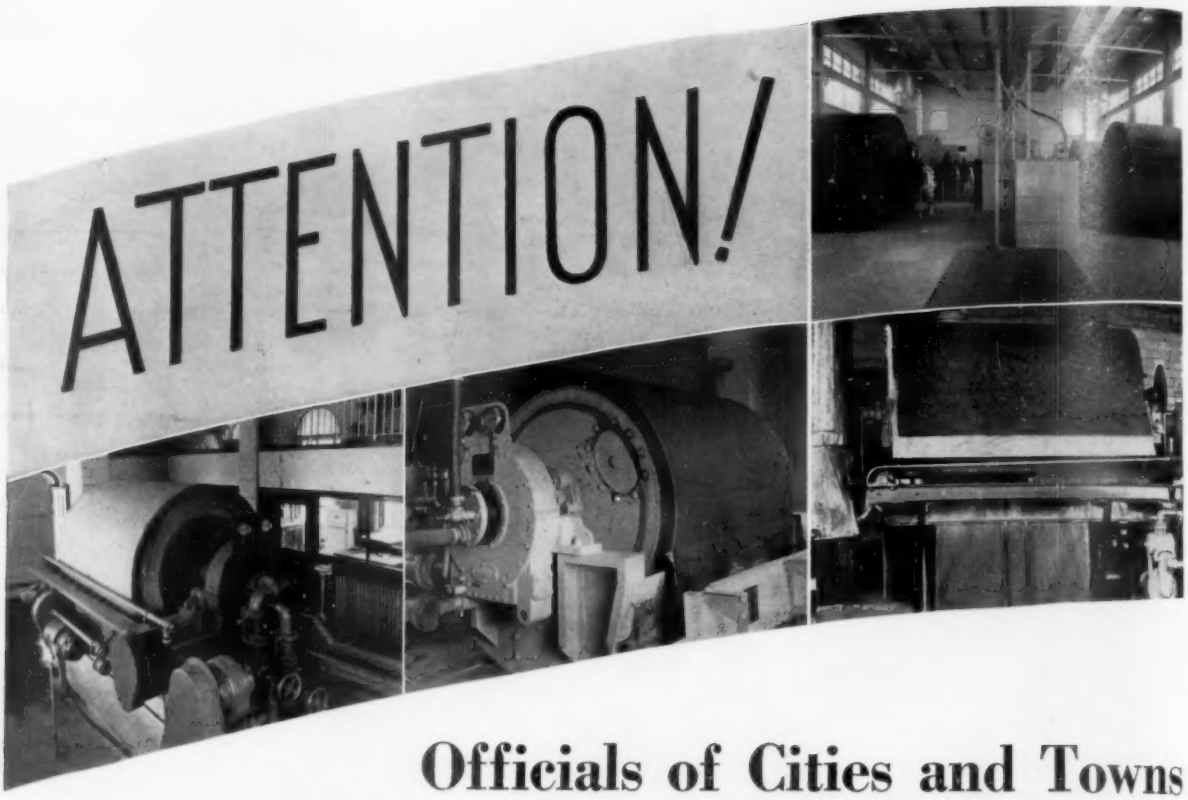
—From the Annual Report of the Board of Public Works, Holland, Mich., for the year ending December 31, 1937.

New Elevated Tank for Freeport, L. I.

THE city of Freeport, on Long Island, New York, has a population of 22,000 and an area of 4.82 square miles. Its water supply consists of six wells with Layne pumps driven by electric power at a cost of 2.07 cents per kilowatt. There are 75 miles of 4- to 24-inch mains in the distribution system. Storage is afforded by the new 1,000,000-gallon elevated tank at the power-house site and the old 500,000-gallon tank located at the northeast well field.

A 1,000,000-GALLON ELEVATED TANK ERECTED LAST FALL AT FREEPORT, LONG ISLAND, N. Y.

Of radial-cone design, the tank bottom is 130 feet above the ground, and the riser pipe is 96 inches in diameter. This tank has a balcony around the shell at high water line. It was erected by the Chicago Bridge and Iron Co.



Officials of Cities and Towns Planning to Adopt Modern Sewage Treatment

We would like to call your attention to five important points:

1—Each of the various approved types of sewage treatment produces a sludge which must be disposed of in some way.

2—The Oliver Mechanical Sludge Dewaterer can be used effectively on any of these sludges.

3—Costs of dewatering by this unit compare favorably with costs by open or covered drying beds.

4—Mechanical sludge dewatering is the sanitary way. Controls odor, no manual handling of dewatered sludge. Everything is automatic and continuous.

5—Oliver United is the pioneer in sludge dewatering with a staff of engineers thoroughly trained in this work. The first units were installed back in 1925. Today, more Oliver United sludge dewatering filter area is installed than any other.

So, insist upon having an "experience" clause written into your specifications in connection with the sludge dewatering part of the modern sewage treatment plant you are planning to install.

• • •

If you are attending the big Hartford meeting, October 6, 7 and 8, inquire for our representative, Ward Pitkin, who will be glad to show you either the Middletown or Hartford installation.

Send for our latest bulletin (2240) on modern sludge dewatering by Oliver United Dewaterers.

OLIVER UNITED FILTERS INC.

NEW YORK
33 West 42nd St.

CHICAGO
221 N. LaSalle St.

SAN FRANCISCO
351 California St.

Street Cleaning and Snow Removal

All-Night Parking Hinders Street Cleaning

FACED with the task of street cleaning during the early morning hours when traffic presents a minimum problem, large and small cities throughout the country are attempting to abolish all-night parking of automobiles on their streets. In a study of street-cleaning practices in 94 cities the American Public Works Association reports that although 73 of the 94 cities make all-night parking illegal, a large number report that their ordinances are not enforced. A total of 40 cities reported that all-night parking is practiced extensively, and others said that it is practiced to some extent.

Examples of parking ordinances aimed to aid in street cleaning include those of Wilmington, Del., which prohibits all street parking between 3 A.M. and 6 A.M., and Cincinnati, Ohio, which limits parking to one hour between 6 P.M. and 7 A.M. except on Sundays and holidays. Louisville, Ky., restricts all-night parking to a designated district, and an ordinance of Kenosha, Wis., provides that no vehicle shall park longer than five hours between 10 P.M. and 6 A.M.

The A.P.W.A. report shows wide variation in street-cleaning methods, equipment and organization, and asserts that, regardless of the type of organization used, "streets are usually as clean as the citizens want them." The quantity and kind of dirt which finds its way into the streets depend in a large part on the character and habits of the people. A large portion of the street dirt consists of waste material ranging from cigarette stubs to newspapers cast there by the citizens themselves.

REMOVING PLOWED SNOW FROM THE CURB IN HOLSTEIN, WIS., WITH A HOUGH FRONT-END LOADER MOUNTED ON AN ALLIS-CHALMERS WM TRACTOR

A PORTION OF THE NEW FLEET OF SNOW-REMOVAL EQUIPMENT IN NEW YORK CITY

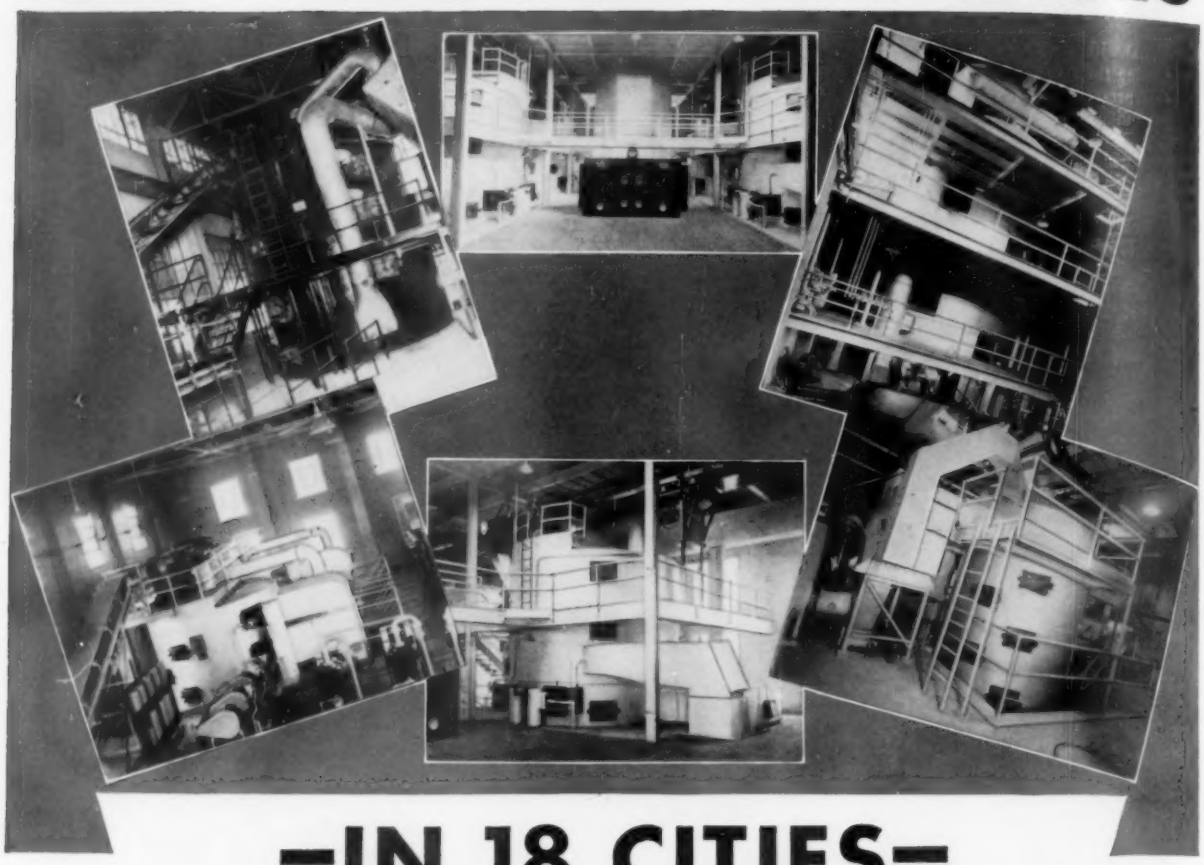
Power take-off operated rotary brooms are mounted on No. 11 Caterpillar Auto Patrols for street sweeping and snow removal

LOADING TRUCKS WITH SNOW AT THE RATE OF ONE EVERY 30 SECONDS

A Snow King rotary loading plow on a Caterpillar tractor owned by the city of Wallace, Idaho. Photograph taken February, 1938

A BAKER PLOW MOUNTED ON AN ALLIS-CHALMERS MODEL K-O TRACTOR IS USED BY THE TOWN OF EAST BARRE, VT., TO KEEP STREETS AND ROADS OPEN IN WINTER

27 HERRESHOFF SLUDGE FURNACES



—IN 18 CITIES—

The eighteen cities that have selected Nichols Herreshoff incinerators may truly designate their sewage works as *disposal* plants. Incineration provides positive sanitary disposal regardless of plant location or climate.

Nichols Herreshoff furnaces have 50 years of industrial operation back of their design and operation. They are simple and economical to operate and provide the utmost in plant flexibility.

The experience of this organization is offered, without obligation, to engineers interested in providing modern and simple equipment for sludge incineration.

NICHOLS

ENGINEERING & NERCO RESEARCH CORP.

60 WALL TOWER NEW YORK, N. Y.

When you write for that catalog kindly mention THE AMERICAN CITY.

Airports and Aviation

Zoning for Safety at Airports

AT the last annual meeting of the National Fire Protection Association the Committee on City Planning and Zoning presented a resolution urging greater care in the construction and operation of airports to reduce the fire hazard. This resolution, reproduced below, was adopted by the Board of Directors on May 11, 1938:

Whereas, unobstructed air space surrounding airports and landing fields is essential for the safe operation of aircraft free from the peril of fire to the occupants, and structures, of aircraft and of ground properties alike; and

Whereas, the increasing size, weight, and speed of aircraft, the growth of aerial transportation, and the importance of adequate airport facilities in our social and economic life and in national defense, are combining to focus attention upon the menace of obstructions in the environs of airports, such as tall buildings, towers, elevated tanks, smokestacks, signs, flagpoles, and electric transmission lines;

Therefore be it resolved by the National Fire Protection Association, an organization devoted to the conservation of life and property from fire, at this its 42nd annual meeting, that

(1) Municipalities, and other political subdivisions authorized to do so, be urged to exercise the police power in the adoption of zoning ordinances applying equitably to airports as well as other land uses;

(2) Public airports and landing fields, and commercial airports of the public utility class, be given the powers of eminent domain for the purpose of (a) condemning air rights over contiguous property so as to insure safe approaches to landing areas, and (b) condemning easements for the air marking of obstructions to air navigation which jeopardize the safety of the public in its use of airports; and

(3) Where not otherwise provided, public utilities commissions act to protect airports and landing fields against the hazards of electric supply and communication lines.

Be it further resolved, that a copy of these resolutions be transmitted to the Federal Bureau of Air Commerce, to the Governors of all states, and to the Mayors of municipalities having airports or landing fields, with an offer of the cooperation of this Association in all efforts made to give effect to these recommendations.

Investigation has shown that comparatively few of the 2,300 airports and landing fields in the United States are protected, and that in an effort to insure safe avenues of approach for aircraft landing on or taking off from established fields, the United States Department of Commerce in 1930 created a Committee on Airport Zoning and Eminent Domain. The situation is that, inasmuch as aircraft approach and leave airports at approximately an angle of 7 feet horizontal distance for each foot of height, or at an angle as flat as 10 to 1 in the case of heavily loaded transport planes, structures surrounding fields constitute a peril in proportion to their height. Since to increase the size of airports so as to secure control over the necessary minimum additional feet in all directions is often impracticable and exceedingly expensive, the necessary protection is best obtained by preventing the erection of such structures and by removing, or air marking, existing structures.

Inasmuch as airports and landing fields have become a public necessity, air protection is in the interest of public safety and general welfare and therefore can be accomplished even under the police power, as by zoning the uses of land surrounding fields, or by eminent domain which involves compensation for the property, or the "air right" thereof, which is taken by condemnation. Some states have enacted airport enabling legislation which grants local governments the power of eminent domain where necessary to secure unobstructed air space. That every state shall do so, and that local governments shall exercise their police powers through zoning ordinances which may frequently obviate the necessity of condemnation, are the objectives of the above resolution.

A review of several hundred landing and take-off accidents occurring during the year 1937, and excluding the horrible accidents of 1938, discloses ten accidents caused by obstructing wires and trees, including the Daytona Beach, Fla., airport disaster, and one accident from a gas tank at the St. Louis, Mo., airport. Hazardous obstructions which have not yet caused accidents include a grain elevator situated approximately 500 feet from the boundary of the St. Louis airport in direct line with the northwest-southeast runway; a gas tank at the Detroit municipal airport; and a railroad signal light at the south end of the north-south runway, and a high smokestack of an asphalt plant at the end of the east-west runway, both at the Columbia, S. C., airport.

AIRPORT ARTICLES IN THIS AND COMING ISSUES
Glynn County, Georgia—October.
Airport Lighting—November and December.

Municipal Airports in the United States

ACCORDING to the Bureau of Air Commerce, Department of Commerce, there were 2,364 airports and landing fields in the United States as of July 1, 1938, and of these, 784 were municipally owned. Of the total number of airports, 715 were partially or fully lighted for night use. In addition, there are 432 commercial airports, 268 Department of Commerce intermediate landing fields, 630 auxiliary fields, 25 naval air stations, 62 Army airdromes, and 163 miscellaneous Government, private and state airports and landing fields.

The accompanying table shows the distribution of these various types of airports by states. A complete review of the facilities of municipal airports in the United States appeared on pages 579-604 of the 1938 edition of THE MUNICIPAL INDEX, published by The American City Magazine Corporation.

STATUS OF AIRPORTS AND LANDING FIELDS BY STATES, JULY 1, 1938

	Municipal	Commercial	Intermediate	Auxiliary	Navy	Army	Miscellaneous Government, Private and State	Totals	Partially or Fully Lighted
Alabama	11	2	7	11	0	3	1	35	11
Alaska	1	7	0	106	0	0	0	114	2
Arizona	9	4	8	20	0	1	0	42	15
Arkansas	12	1	4	9	0	0	3	29	7
California	50	41	19	46	5	4	15	180	62
Colorado	13	4	3	14	0	0	0	34	7
Connecticut	7	6	1	3	0	0	1	18	7
Delaware	1	4	0	0	0	1	0	6	3
Dist. of Columbia	0	1	0	0	1	1	0	3	3
Florida	48	14	3	55	5	2	5	132	27
Georgia	22	3	10	21	0	1	0	57	19
Idaho	18	0	9	11	0	0	9	47	14
Illinois	13	30	6	0	0	2	3	54	26
Indiana	14	16	8	6	0	2	3	49	20
Iowa	16	7	3	5	0	0	2	33	10
Kansas	21	5	5	10	0	2	0	43	15
Kentucky	9	0	3	6	0	1	1	20	4
Louisiana	12	1	3	8	0	1	5	30	9
Maine	10	5	0	6	0	0	1	22	5
Maryland	2	8	1	1	1	3	3	19	9
Massachusetts	9	22	1	6	1	0	0	39	11
Michigan	57	13	0	19	1	3	34	127	23
Minnesota	12	3	3	14	0	1	1	34	9
Mississippi	13	0	6	11	1	0	0	31	13
Missouri	10	5	13	4	0	0	4	36	18
Montana	25	0	12	26	0	0	10	73	18
Nebraska	15	3	4	6	0	2	1	31	15
Nevada	3	3	8	6	1	0	0	21	11
New Hampshire	6	2	0	5	0	0	0	13	3
New Jersey	5	12	0	1	2	2	1	23	8
New Mexico	4	3	10	14	0	1	4	36	13
New York	27	36	4	13	0	4	9	93	27
North Carolina	15	5	2	6	0	1	0	29	9
North Dakota	18	3	5	14	0	0	1	41	9
Ohio	31	37	9	22	0	4	13	116	24
Oklahoma	21	6	7	8	0	1	1	44	22
Oregon	12	3	9	10	0	0	2	36	16
Pennsylvania	21	58	9	10	1	1	13	113	37
Rhode Island	0	2	0	3	1	0	1	7	1
South Caroiina	11	3	4	7	2	0	2	29	7
South Dakota	18	2	0	5	0	0	0	25	1
Tennessee	11	1	8	5	0	0	0	25	14
Texas	54	9	24	28	0	13	5	133	49
Utah	6	1	11	2	0	0	0	20	13
Vermont	6	2	0	3	0	1	0	12	1
Virginia	12	11	8	9	2	1	1	44	17
Washington	24	7	5	7	1	3	4	51	17
West Virginia	11	5	0	7	0	0	1	24	2
Wisconsin	24	16	3	5	0	0	3	51	18
Wyoming	14	0	10	16	0	0	0	40	14
Totals	784	432	268	630	25	62	163	2,364	715

ELEMENTS of PUBLIC SAFETY

GAMEWELL

Fire Alarm

VITAGUARD

For

Volunteer Fire Departments

Despite the great individual fire losses in large cities which frequently run well into millions of dollars, approximately 70% of the annual fire loss occurs in communities of less than 20,000 population. In other words, more than two-thirds of the fire loss occurs in the communities largely dependent upon volunteer fire fighters.

The Vitaguard Fire Alarm System, with its associated public alarm equipment — designed to last for a quarter century—is Gamewell's latest contribution to public safety in cities having volunteer firemen. All elements are extremely simple in design, yet the operation after the initial manual act of pulling a box is entirely automatic, and *directs the firemen to the location of the fire.* The price is within the means of any community.

Police Signal

Write for description and estimates

THE GAMEWELL COMPANY

NEWTON UPPER FALLS MASSACHUSETTS

Public Safety

Traffic Rules for Children

1. Start to school early enough so that you will not have to rush.

2. Plan the safest trip to and from school, and follow it every day.

3. Always cross at the crossing, never in the middle of the block.

4. Cross only with the safe lights.

5. Be alert at all times when crossing streets.

6. Obey the officer or safety-patrol boy on duty at the crossing.

7. Don't hitch rides or dart out onto the street from behind parked cars or hedges.

8. Play in safe places—playgrounds, play streets, vacant lots, not on dangerous streets.

9. Ride bicycles on the right side of roadways, and obey traffic signals and stop signs.

10. On rural highways always walk on the left, facing traffic.

HERBERT J. STACK,
New York University, New York City.

Traffic Signals Speed Clearance

COFFEYVILLE, KANS., placed traffic signals (Crouse-Hinds) at six intersections in May, 1937, and reports 49 accidents during 12 months after their installation, compared with 68 in that period before installation. The city's verdict is that signalization clears traffic faster and with much less confusion, and signals will be installed at three more intersections.

Photo Evidence Outfit; Progressive Traffic

TWO of our recent improvements here, though wide apart as the poles, comprise an Eastman Photo Evidence Outfit and a new system of staggered traffic lights. The camera is an Eastman View camera with F. 7.7 lens compur shutter. Light is furnished by four photo-flood bulbs, which are attached to the tripod by a large metal arm, the light being deflected against two large white reflectors, giving indirect light on the subject. The 5 x 7-inch ground glass film holder is removed for testing "mugging" photos, for which a special adaptor is provided, as part of our equipment, and is placed upon the back of the camera.

We have installed on our main thoroughfares a progressive system of traffic lights by which a person driving between 15 and 20 miles per hour can clear four to five blocks without stopping, whereas with the old system we had a clearance of only two blocks.

R. B. JORDAN,
Chief of Police, Richmond, Va.

Guard-Rails That Warn and Deflect

THE purpose of a good guard is, first, to warn drivers of danger, and, second, to deflect out-of-control cars back onto the highway. Naturally, lower rates of speed and other conditions in urban areas do not require as extensive use of guards as required in rural areas.

The Chicago Park District has made several installations of Tuthill Guards, principally along curves or as divisional barricades at intersections where it is desirous to prevent left turns or cross traffic. These installations have all been made within the last four years and some recently, and are proving very satisfactory. Since installation of the guards, there have been only one or two instances of accidents, resulting in property damage only. This low accident occurrence I attribute to the good visibility advantage of this type of guard.

While the initial cost of installing Tuthill Guards is slightly higher than for other types of guard-rails, it is our experience that the maintenance cost is lower, due to the fact that the plate guards can be replaced without having to readjust anchorage, or other tension devices, since none are employed. We have in mind installing several thousand feet.

OTTO K. JELINEK,
Traffic Engineer, Chicago Park District.

Loud-Speaker Cars

FOR several months we have been using loud-speaker cars on our streets, and I believe the results have been excellent. Visitors from all eastern points have commented favorably and with a certain amount of amazement that our traffic conditions are so orderly, and as for jay-walking, it is practically nil.

While I cannot say that jay-walking has resulted in a large number of deaths, it certainly has caused casualties, and this type of casualty has now been almost entirely eliminated. Double parking and improper use of traffic lanes have been corrected, and we are proud of results achieved by our loud-speaker cars.

IRA A. MARTIN,
Chief of Police, Spokane, Wash.

KEEPING THEM ON CHICAGO PARKWAYS

Upper left and center, applications of the Tuthill Guard; upper right, Multisafety cable highway guard of the American Steel and Wire Co., serving also as a fence on Lake Shore Drive

THE QUICKEST, SUREST WAY TO CLEAR STREETS AND ROADS OF ICE AND HARD-PACKED SNOW IS TO USE INTERNATIONAL ROCK SALT

POUNDS OF ICE MELTED PER POUND OF CHEMICAL—MAINTENANCE COMMITTEE, HIGHWAY RESEARCH BOARD Vol. 13		
Temperature Deg. F.	Sodium Chloride (Salt)	77-80 percent Flake Calcium Chloride
30°	46.3 lbs. of ice	31.1 lbs. of ice
25°	14.4 lbs. of ice	10.4 lbs. of ice
20°	8.6 lbs. of ice	6.8 lbs. of ice
15°	6.3 lbs. of ice	5.5 lbs. of ice
10°	4.9 lbs. of ice	4.8 lbs. of ice
5°	4.1 lbs. of ice	4.4 lbs. of ice
0°	3.7 lbs. of ice	4.0 lbs. of ice
—6.5°	3.2 lbs. of ice	3.7 lbs. of ice

ADVANTAGES OF SODIUM CHLORIDE AS CALCULATED BY INTERNATIONAL SALT COMPANY, INC.
48.9%
38.4%
26.4%
14.5%
2.0%
— 6.8%
— 7.5%
—13.5%

DISINTERESTED AUTHORITIES FIND ROCK SALT THE MOST EFFICIENT CHEMICAL FOR MELTING ICE

COMMON law and city ordinances say that ice and snow must be *removed* to make sidewalks safe for pedestrians. Public officials know that high-speed winter traffic can travel in utmost safety, only on bare streets and roads.

In early years, one step toward winter traffic safety was to scatter sand or cinders—but they were only partially effective until blown or brushed aside. Another step forward and a popular method today is to imbed grits in ice to make an "anti-skid" surface. Rock Salt made this practical. It is an abrasive itself. It has the greatest melting power of any available chemical. It speeds up imbedment and holds more grits longer.

Many communities are now finding it truly economical to have utmost safety from bare pavements, by using Rock Salt to melt ice away or prevent its forming. Officials know how salt prevents snow from packing and how it melts through and undercuts ice until it is quickly crushed by traffic and can be easily removed. This saves the cost of buying, treating, storing and applying abrasives, and the cost of removing them from streets and sewers later. It saves more lives and property damage so that it is most economical in the long run, to have real winter safety from bare streets.

International Salt Company, Inc., maintains a complete Research Department and a Road Engineering Department. Both have worked in close co-operation with street and road officials for many years. Modern methods for using Rock Salt have been proven by actual and practical tests. All this long and wide experience is offered at no cost or obligation to street and highway departments, through the International Salt Advisory Service. Ask for any information about the methods of ice control required by local conditions and circumstances. Write for the book, "Make Icy Pavements Safe."

BLACK HEADLINES

LIST THE KILLED AND INJURED

● How bad is America's record for death and destruction from winter traffic? Nobody knows! International does know that it is an enormous loss. Last winter, International gathered news items of the 3,542 skidding accidents serious enough to make the newspaper headlines. In these, 413 people were killed and 2,990 injured. Ice accidents killed 52 pedestrians and injured 1,721 in the same period. This is why street and road officials say that icy pavements must be *cleared* to make them safe for winter traffic.

INTERNATIONAL SALT COMPANY, Inc.
SCRANTON, PA. NEW YORK, N. Y.

OCTOBER, 1938

Vol. LIII, No. 10

The American City

470 Fourth Avenue
New York

35 Cents, $2 a Year

New Primary Sewage Plant at Middletown, Connecticut

Installation Includes Vacuum Filter and Multiple Hearth Incinerator for Sludge

THE new compact primary sewage-treatment plant at Middletown, Conn., is designed to lighten the burden of pollution in the Connecticut River and to minimize the problem of sludge disposal. Present heavy pollution of the river by cities in Massachusetts would make secondary treatment an unwarranted burden on the city of Middletown, but the plant is so designed that any one of several methods of secondary treatment may be added as required, when the standard for the river is to be improved. The features of the plant are its mechanically equipped units, gas storage, dewatering of the sludge by a vacuum filter, and its disposal by incineration.

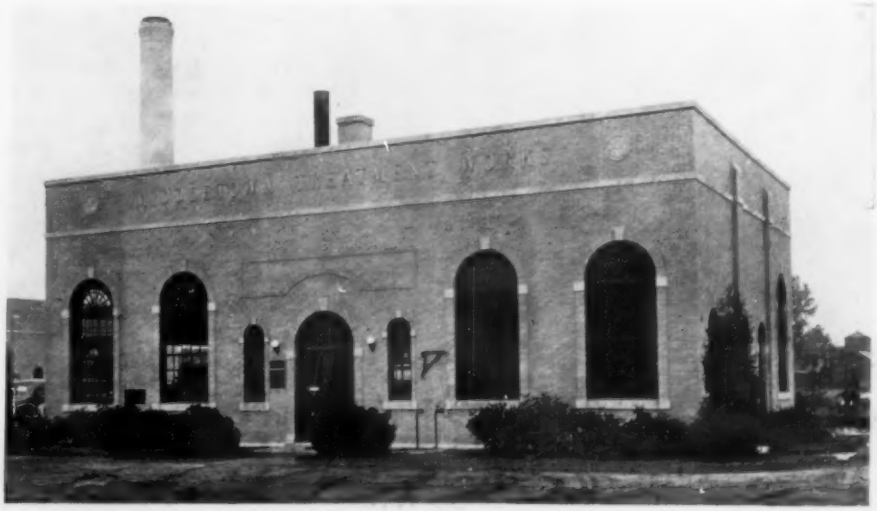
The sewage system is a combined one, with overflow weirs of the Brown and Brown Co. regulator type at strategic points so that excess storm flow may be delivered direct to the river instead of overloading the sewage-treatment plant.

Handling the Influent

The sewage of Middletown, which has a population of 25,000, is carried to the plant by 30-inch concrete and 12-inch cast iron gravity sewers and a 12-inch cast iron low-level line. Sewage from the low-level line is raised by duplicate American Well Works 200-gpm pumps to the regular influent line. These pumps are automatically controlled by floats. Either unit, manually controlled, can be used to handle the drainage of the plant. Only 18,000 people are now connected to the plant, producing a flow of 1.25 mgd. The plant, however, is designed for 3 mgd, or a population of 30,000.

The actual flow of sewage into the plant is controlled by two Chapman sluice-gates just outside the main building. A third sluice-gate permits emergency by-passing to the Connecticut River through a 24-inch outfall sewer. This pipe line was constructed on piles across a swamp and then was jacked under a single-track railroad line. The low-level line is gated and is closed during flood stages of the river.

Upon entering the building the sewage goes to a pair of Link-Belt combination grit chambers and bar screens, which are cleaned by rakes set to operate every fifteen minutes during normal flows and at shorter intervals in time of storm. The screenings fall into a trough at the rear of the screens and are raked onto a conveyor belt which delivers them to the plant incinerator.



EXTERIOR OF THE BRICK BUILDING HOUSING THE MIDDLETOWN, CONN., SEWAGE-TREATMENT PLANT

Screened sewage flows through two cast iron pipes which converge into one, and then passes through a Simplex venturi meter with a 18-inch tube and a 9-inch throat. The rate of flow is indicated on a dial in the basement of the plant, as well as on a recording gage and totalizer on the ground floor.

Settling Tanks and Sludge Digestion

There are two settling tanks, each 75 feet long, 14 feet wide, and carrying 10 feet of water. These are equipped with Link-Belt Straightline sludge and scum collectors and scum boards. The normal retention period is two hours when the two tanks are in service. The sewage then flows to the 24-inch effluent pipe line.

The sludge scrapers are operated at a speed of 3 feet per minute for an average of 6 hours per day, and sludge is pumped from the settling tank hoppers once every 24 hours by one or both of the two Carter sludge pumps located in the basement of the plant. Scum from the troughs is pumped at the same time as the sludge.

The two sludge digestion tanks are each 35 feet long, 16 feet wide and 16 feet deep, and are equipped with Link-Belt scum breaker and sludge collector devices and automatic adjustors outside the tanks to take up the slack in the drive chains. The digester mechanisms are operated eight hours per day, and the sludge pumps delivering the sludge from the settling tanks are operated four hours daily. Supernatant liquid from the digesters is displaced to the sewage influent line.

The digesters are equipped with gas-collecting domes from which an automatic Ingersoll-Rand gas compressor takes the gas and delivers it to a 2,700-cubic-foot horizontal cylindrical tank mounted on top of the digesters. Sludge gas is used to heat the building and the digesters, and to fire the Nichols-Herreshoff sludge incinerator.

Dewatering the Sludge

Digested sludge is pumped by the sludge pumps to two conditioning tanks of 4,600-gallons capacity each. These are equipped with Link-Belt agitators driven by 2-hp General Electric motors. The chemicals, lime and ferric chloride, are weighed out in the chemical room on the ground floor of the operating building, adjacent to the laboratory, and the lime is dropped through an opening in the floor into the conditioning tanks, while the ferric chloride is weighed, taken down and mixed with water at the conditioning tanks. Four hundred pounds of lime and 150 pounds of ferric chloride are used for conditioning 2,000 gallons of digested sludge, producing 6½ tons of cake of 40 per cent solids.

THE OLIVER VACUUM FILTER FOR DEWATERING SLUDGE AT THE MIDDLETOWN, CONN., SEWAGE-TREATMENT PLANT

The Oliver vacuum filter is 5 feet 4 inches in diameter and 6 feet long, and is operated from four to six hours per day for four days a week. The filter is driven by a Reeves variable-speed belt, but the usual rate is three minutes per revolution. The dewatered sludge is delivered to the same belt that handles the screenings and is dumped into a spiral feed which delivers it to the Nichols-Herreshoff sludge incinerator.

The vacuum filter is covered with cotton flannel cloth. A 22-inch vacuum is maintained on the filter during operation by an Oliver vacuum pump driven by a 7.5-hp Westinghouse motor. The filtrate is removed by a 2-inch Oliver filtrate pump driven by a 3-hp Westinghouse motor. A Victor-Acme rotary blower is used to furnish the compressed air for breaking the cake from the vacuum filter. The cake varies from ¼- to ½-inch thick, and on the basis of a recent monthly run averages about 60 per cent moisture. The output averages 10 to 12 pounds of dry solids per square foot of filter. During the fall, winter and spring there was so much demand for sludge cake for use around the plant and on a nearby ball field to develop a good turf that most of the sludge has not been incinerated.

Sludge Disposal

In the basement, in a room separated from the main basement of the plant by a 12-inch concrete wall, is located the Nichols-Herreshoff sludge incinerator and its accessories, as well as a flame trap, a pressure-reducing valve for digester gas, a control panel and pyrometer. The circular sludge incinerator is 9 feet 3 inches outside diameter and has four hearths. Either digester gas or oil can be burned. Pre-heated air is delivered to the bottom hearth of the incinerator. A blower takes the hot gases from the top of the sludge incinerator and delivers them to the pre-heater and thence to the stack. Air is raised to a temperature of 400 degrees F. by a central cooling shaft, and to 650 to 850 by the pre-heater, where it is heated by the exhaust gases from the top of the incinerator. The temperature on the top hearth of the Nichols-Herreshoff incinerator, where the dewatered sludge is first delivered, is 800 degrees F.; on the second hearth it is 1000 degrees F., on the third hearth from 1200 to 1400 degrees F., and on the fourth or bottom hearth the temperature varies from 1400 to 1600 degrees F. These temperatures are adequate to destroy all odors and prevent smoke. The ash from the bottom hearth is delivered to a small 6-inch bucket elevator which raises it to an enclosed steel storage bin below the roof of the plant. A chute from this bin delivers the ash to a truck, which hauls it away for fill. The unit incinerated 750 pounds of sludge cake per hour during a 30-day test.

A Spencer Turbo compressor furnishes air for atomizing the oil when the oil burners are used for firing the sludge incinerator. A Pacific Flush Tank Co. flame trap with a dry seal and a Davis Regulator Co. pressure-reducing valve is located in the incinerator room. The gas in the storage tanks on top of the digesters is maintained at a pressure

of 25 pounds and a relief valve blows off above that pressure. This 25-pound pressure is reduced to 8 inches of water for use in the incinerator and for other services in the plant.

Other Features

The exterior brick is an attractive buff face brick, and the interior of the building is completely lined with white glazed terra cotta tile. On the first floor, in the same room with the screens and sludge filter, is the main switchboard for all pumps and all other equipment except the sludge incinerator. The switchboard is built for full automatic or hand control.

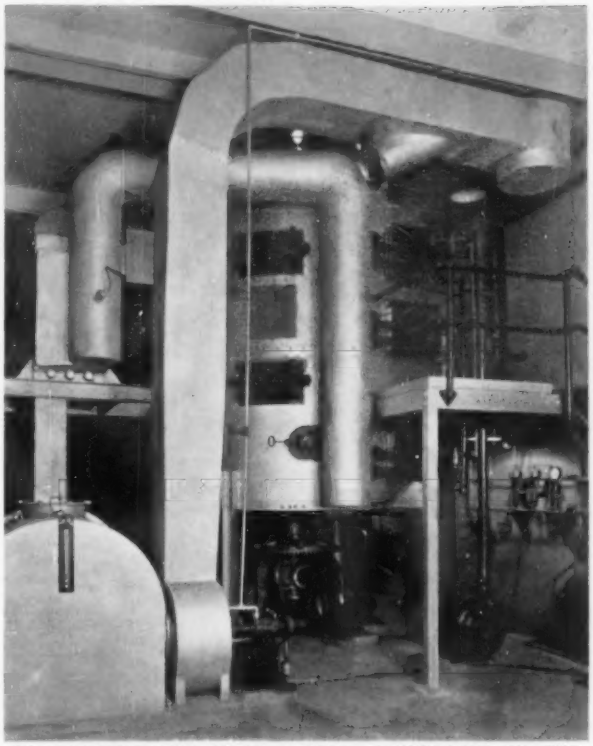
In the basement is a Knowlton hot water boiler for heating the digester water. It is equipped with an automatic sludge gas burner and a hand-controlled oil burner. Adjacent to it is a Burnham steam boiler for heating the building. This is equipped with a hand-controlled sludge gas burner and an automatic oil burner.

To insure against any mix-up in repairs or the tapping of the wrong pipe lines in the building, each service is identified by a different color. All sludge gas lines are painted red, hot water lines are painted green, air lines are blue, sewage mains are black, drinking-water lines are aluminum color, fuel-oil lines are yellow, and all electrical conduits are olive.

Personnel and Costs

The new sewage-treatment works were built as part of a program involving a $500,000 grant and loan from the Federal Government, of which $225,000 was a grant. The city saved enough money because of favorable bids on all contracts so that it was possible to construct a new garbage and rubbish incinerator adjacent to the plant as part of the same program. The sewage works were placed in operation by the contractor, the Suburban Engineering Co. of New York City, in June, 1937, and operated for three months before being turned over to the city. The plant was designed by Thomas F. Bowe, consulting engineer, of New York City, and is operated under the direction of Richard E. Mylchreest, Chairman of the Board of Public Works, and Samuel C. Cannon, Superintendent, Department of Public Works, with Harry C. Bauer and Martin Swanson as operators of the sewage-treatment plant and the new incinerator.

T. R. K.—788.



THE NICHOLS-HERRESHOFF SLUDGE INCINERATOR IN THE BASEMENT OF THE BUILDING

Abolition of Tax Exemption on Future Bond Issues Urged

WITH a recommendation that "further new and refunding issues of securities by the Federal, state and local governments should not carry exemption from income taxes," the Committee on Debt Adjustment of the Twentieth Century Fund, of New York, made public last month the results of a study of the debt position of the 175,000 governmental units in the United States.

Tax exemption, the Committee claims, "makes it unhealthily easy for government bodies to go into debt," because they can get money at a lower rate of interest than otherwise. It also makes debt investments too attractive to wealthy people who can best afford to run the risks of direct ownership in stocks, real estate and other equities.

In connection with its recommendation on tax exemption, the Committee, under the Chairmanship of J. Lionberger Davis, Chairman of the Board of the Security National Bank Savings and Trust Company of St. Louis, says:

"The abolition of tax exemption on issues now outstanding is, of course, impossible. But President Roosevelt and certain leaders in Congress deserve support of their proposal to prohibit future issues of tax-exempt securities. Such a prohibition should be made immediately; and, if constitutional changes prove necessary, an amendment for the purpose should be adopted as soon as possible. It will of course be many years before all the tax-exempt issues now outstanding can be retired. But if new and refunding issues carry no tax exemption, the diversion of new savings from direct ownership to debt investment can be largely corrected within a few years."

Decrease in State and Local Indebtedness

With its recommendation the Committee made public a summary of the facts which had been gathered for it by a special research staff of the Fund about the debt position of governments in the United States.

The figures in the research report show that during the boom years of 1923-1929 the debts of state and local governments increased by more than $5,000,000,000 owing to bond issues for school construction, highway building, etc. This increase was more than offset by a decrease of about $6,000,000,000 in the Federal debt. During the later years of the depression, however, the process was reversed. The "net debt" of all state and local governments—deducting cash and sinking-fund holdings—reached a peak of almost $16,500,000,000 in 1933, but has since declined to less than $14,000,000,000.

Lime Treatment of Well Waters at Panama City, Florida

Three Wells of Varying Hardness Furnish Adequate Supply

By THEODORE REED KENDALL
Engineering Editor, THE AMERICAN CITY

THE city of Panama City, Fla., is strung along the Gulf of Mexico for a distance of seven miles and comprises the communities of St. Andrews, Millville, and Bay Harbor as well as the portion known as Panama City. Although all four are under the same municipal government, there are four separate post offices, each with its duly appointed postmaster. The total population of Panama City is 14,000, and all are supplied with water from the new well system and filtration plant placed in operation December 16, 1936.

New Wells

The old wells were scattered over the city and were driven into coral delivering a water of a hardness of 225 ppm. In order to determine the best locations for the wells and the new filtration plant, which would most economically be located as near to the wells as possible, a survey was made by means of test wells. A total of 32 test wells were driven, starting at the St. Andrews end of the city, which is farthest from the 30 wells of the Southern Kraft Co. The city wanted to keep as far as possible from this field because of the draw-down.

Finally, three satisfactory wells of hardness of 72, 55 and 150 ppm were located toward the Bay Harbor end of town away from St. Andrews. Three 8-inch gravel wall wells were driven into sand, and on the latest tests they show the following flows:

Well	Depth	Capacity	Hardness
No. 1	80 feet	185 gpm	9 ppm
No. 2	79 feet	175 gpm	8 ppm
No. 3	135 feet	375 gpm	92 ppm

Wells 1 and 2 are pumped with 4-inch Layne & Bowler deep-well pumps, and each well is covered with a brick well-house with a removable roof. Well 3 has a 6-inch pump of the same make. Each well pump is equipped with a separate discharge pipe with an open end, and controlled by a separate valve. This test pipe contains a smaller pipe for a pilot tube, so that at any time without disconnecting the well from the system it can be tested as to its flow.

Water Treatment

The three well pumps deliver the water directly to an Infilco aerator, where 50 pounds per 24 hours of lime is added by means of an Infilco dry feed machine located just inside the filter building. The aerated and treated water flows through a distributing flume which has a novel and effective control for the proper distribution of the water to prevent short-circuiting in the settling basin. In the bottom of the flume are eight holes 6 inches in diameter through which the water flows into the basins, but as the flow must be controlled or most of the water would be flowing through the farthest hole, sliding covers are so arranged that they can be swung across the holes and thus alter the sizes of the space through which the water may gain access to the basin. By this means the flow of water through the basin has been maintained in a perfectly uniform manner.

The water has a two-hour retention period in the settling basin, which is equipped with an 8-inch safety overflow pipe in case the filters are shut off before the pumps at the wells. The settling basin is cleaned every three months. At the end of the basin the water flows over a concrete weir into a flume which practically duplicates the entrance flume except for the lack of holes. At the end of the effluent flume the water flows down into a 10-inch cast iron pipe which carries the water to the two filters, the pipe reducing to an 8-inch beyond the first filter. The pipe is located within the settling basin and then enters the filters through the separating wall.

The Filters

The plant is equipped with two filters of ½-mgd capacity each. Each filter has two cast iron wash-water troughs, the top edges of which are 18 inches above the top of the sand. The collection system is a cast iron manifold 14 inches in diameter with 2-inch laterals having ¼-inch holes spaced 6 inches on centers on the undersides of the pipes. The filter sand is 30 inches deep supported on 20 inches of graded gravel.

The operating floor of the plant is the second floor and contains the floor stands for the filter operating valves, which are all Mueller-Columbian. Infilco rate-of-flow and loss-of-head gages show the operating condition of the filters, and another Infilco gage shows the depth of the water in the clear well, which has a capacity of 100,000 gallons and is located beneath the entire building, providing direct suction for the pumps on the ground floor.

The filters are washed every four days by water pumped direct from the clear well by the DeLaval wash-water pump on the ground floor. This pump has a capacity of 2,700 gpm and is driven by a 25-hp General Electric motor. It is located at the end of the filter effluent line.

The water from the filters enters the clear well, where it is sterilized with chlorine controlled by a Wallace & Tiernan vacuum type chlorinator to apply 1.5 pounds per 24 hours to the average 400,000 gallons consumption.

Pumping and Recording Equipment

The high-pressure pumps for the city service are located

THE WATER-TREATMENT PLANT OF PANAMA CITY, FLA.

1. General view of the front of the filter building. 2. The rear of the plant, showing the elevated tank, one of three on the distribution system. 3. The Infilco aerator. 4. The two DeLaval 750-gpm high-pressure pumps seen from the filter operating floor

on the ground floor and consist of two DeLaval 750-gpm centrifugals driven by 40-hp G-E motors against a 150-foot head. All the pumps are equipped with Mueller check-valves. A Foxboro indicating and a Foxboro recording gage on the pump board show the pressures in the system at all times.

Push-button controls for starting and stopping the pumps are located at the switch-boxes for each pump on the ground floor, and duplicate buttons are located on the filter floor above. A Republic flow meter with indicating and recording and totalizing dials is located on the ground floor to show the total pumpage.

The Meter Shop

The building in which the filters and pumps are located measures 57 x 27 feet, and the settling basin outside is the same size. The building also houses a small but complete meter testing and repair shop and a heater for cool weather.

A Mueller meter tester with the weighing tank mounted on a Fairbanks platform scale shows the condition of the meters, and bins on a small bench contain all the necessary gear trains and other repair parts for placing meters in first-rate condition after they have been damaged or worn through long service. The city is 80 per cent metered with ⅝- to 4-inch meters of Trident and Tropic makes.

Also located in the filter plant in a separate room is a shower bath, lavatory and toilet. There is a telephone with a large gong in the pump-room so that when a call is received the operator on duty will be able to hear the bell when the pumps are running. If there is a fire, the Fire Department calls the operator at the filter plant and tells him the location and severity of the fire. There are three plant operators working 8-hour shifts so that there is always an operator on duty. The shifts change on the 1st and 16th of each month.

Distribution System and Tanks

The distribution system of Panama City consists of near-

ly 24 miles of 10-, 8-, 6-, and 4-inch cast iron pipe. Two new and one old elevated steel storage tank are so located on the system as to give an even pressure curve for services at all times. The old tank of 100,000 gallons capacity was installed by R. D. Cole & Co. for the earlier system and is located in St. Andrews, the farthest from the new plant. The other two tanks, of like capacity and make, divide the city into thirds, one of them being located at the filtration plant. The two new tanks have a bottom elevation of 122 feet and the older and more distant tank has a bottom elevation of 100 feet.

The Panama City, Fla., filtration plant, including the new elevated tanks, was designed to care for a consumption of about one million gallons daily. The present consumption averages 400,000 gallons but reaches a maximum of 500,000 gallons during the hottest weather, which occurs in August. The filtration plant is so designed that it can readily be extended at the end away from the pumping section. It was designed jointly by the Water Works Superintendent, E. B. Barnett, and H. D. Shope, engineer of the Southern Kraft Co.

An interesting commentary on the closeness with which consumers watch the development and changes in a waterworks system was obtained in Panama City, when inquiries were made locally regarding the new supply. The immediate response from a housekeeper was that the water is not as soft now as it was six months ago: "We notice it in the laundry and bath." When the operating officials were asked to comment on this, it was learned that for a period of about six months a somewhat larger proportion of the water for the city has been drawn from the larger well of higher hardness, but the water as delivered to the mains now is much softer than was delivered before the completion of the new plant. It is axiomatic that once we receive an improvement in any service, public or private, we expect the continuance of that service in the same degree without any abatement. Think of the radio, for example.

K.—823.

The City of Akron Garbage Survey—Household Treatment of Garbage

By T. B. KIMBER
Chief Clerk, Department of Public Service, Akron, Ohio

IN a previous article dealing with the organization and procedure of a garbage survey made in Akron, Ohio (THE AMERICAN CITY, September, 1938, pages 72 and 73), mention was made of a study of the household preparation and treatment of garbage prior to its removal by the Garbage Collection Department. Garbage concerns the householder more closely than almost any other branch of municipal service, and the cooperation of the public is essential not only to facilitate the removal of accumulated garbage but to protect public health as well.

The city of Akron, like other municipalities, has an ordinance designating the type of receptacle to be used by the householder. This provides:

> "It shall be the duty of every owner, tenant, agent, lessee, occupant and other person in charge of any and every building, premises or place of business in the city of Akron, forthwith to provide or cause to be provided to the exclusive use of such building, premises or place of business, watertight, galvanized receptacles of not less than 10 or more than 30 gallons capacity, with a suitable cover of the same material, for the reception of all garbage that may accumulate on or about such premises."

Flies constitute a definite menace to public health, and any fermenting organic matter, such as garbage, becomes an ideal breeding place. Naturally, any situation which permits organic matter to accumulate or to be exposed, involves health dangers. The responsibility for eliminating these dangers and for providing sanitary measures is twofold. It is the responsibility of the city to remove garbage before organic fermentation sets in. It is the responsibility of each householder to handle and prepare his garbage for removal in a sanitary manner in accordance with the ordinance and departmental regulations.

Many Violations by Householders

At the time a physical survey was being made of the garbage collection activities, a check was made of the household treatment of garbage by the field crews following the collection trucks. Mimeographed forms were supplied each checker, upon which space was provided to note all violations of the city ordinance pertaining to cans, the nature of the violation as well as the general location and general character of the district being surveyed. During the field check a total of 59,500 pick-ups were recorded in the city of Akron. A pick-up was defined as the removal of garbage from one garbage-producing unit. All violations were noted. In many instances it was found that several violations could be recorded at one pick-up. However, regardless of the variety or number of violations noted at a single pick-up, a maximum of one violation was recorded.

When the findings were tabulated and a rather high percentage of violations was noted, it was readily seen that corrective steps would have to be taken to eliminate, first of all, a serious potential health menace, and, secondly, to correct a condition which could only retard an orderly collection system.

Violations Cause Delays

A 10-second delay at each pick-up caused by a defective can would soon involve a great amount of lost time. Likewise, receptacles smaller than the 10-gallon minimum filled up quickly and were the source of numerous complaints. On the other hand, cans or receptacles larger than the ordinance maximum throw an unnecessary weight burden upon the collectors. Hence, any improvement would tend to correct possible unsanitary conditions and at the same

AT RIGHT—THE "PLEASE COOPERATE" CARD USED IN AKRON WHICH PRODUCED AN IMMEDIATE 20 PER CENT IMPROVEMENT IN THE CONDITION OF GARBAGE RECEPTACLES

time would eliminate unnecessary delays in collection procedure.

Checking Violations

While the survey was still in the process of completion, it was assumed that the majority of the ordinance violations could be traced to a lack of knowledge of departmental regulations and the city ordinance, and to a lack of appreciation of the health menace involved. Accordingly, the first step was to visit several hundred violators at random. After ordinance regulations were explained, and the sanitary aspects pointed out, an immediate response was noted. Over 50 per cent of the householders interviewed provided proper cans after one call. As a result of subsequent calls, approximately 25 per cent more provided themselves with ordinance cans. The remaining 25 per cent refused to do anything about the situation owing to lack of funds, or stating that their present receptacles were satisfactory to them even though they did not meet ordinance specifications.

The lack of proper garbage receptacles and the presence of unsanitary conditions were especially noticeable among commercial establishments, but here again it was believed that a lack of public education permitted such a condition to exist. As was the case with the householders, when asked to cooperate with the garbage department, commercial establishments readily responded.

Educational Program

The conclusion reached as a result of the household check in Akron was that a public education program asking for public cooperation would reduce greatly the number of violations and at the same time safeguard health standards and facilitate the orderly removal of garbage.

To inform householders and commercial establishments of regulations and to seek their cooperation, a card was devised and distributed to each and every garbage-producing unit within the city of Akron. Response was immediate. Within two months the collection department reported a 20 per cent improvement in the condition of receptacles.

Experience in Akron has demonstrated that with public education and a continuing effort to enforce regulations, the problem of household and commercial garbage ordinance violations can be reduced. Experience has shown, too, that the problem can be solved only by active participation by both city and individual householder.

The American Public Works Association

will hold its 44th Annual Conference October 3-5 in New York City, at the Hotel Pensylvania.

The subjects presented in papers and discussions at the various sessions will include New York City's Public Works Activities and Their Organizations; Motor Equipment Maintenance in New York's Department of Sanitation; Asphalt Street Repair Methods Compared; Refuse Disposal for the Smaller Municipalities; Snow-Removal Experiences; Sewerage Problems Resulting from Modern Developments; Standards of Street Lighting for Municipalities; Street and Road Design for Safety; Appraising the Accomplishments of the WPA; Should Traffic Engineering be in the Police or the Engineering Department?; Public Education as a Factor in Street Sanitation; Allocating Space for Underground Structures; The Control and Regulation of Pavement Cuts; Newly Discovered Facts About Our Highway System; Traffic and Parking Control; Street Repair and Maintenance Problems.

CITY OF AKRON

Important to You

Suggestions to Householders Relative to Garbage Collection

The City of Akron is making every endeavor to give you a regular and efficient garbage collection service. This can be done only with your help in preparing garbage for removal. Your cooperation is asked in observing the following regulations and suggestions:

1—City ordinances require that each householder provide a water-tight, galvanized iron receptacle of not less than 10 gallon nor more than 30 gallon capacity with a suitable cover of the same material for the reception of all garbage. Smaller cans fill up between collections; larger cans place an unnecessary burden upon the collectors. Oil drums, lard cans, paint cans, wooden receptacles, etc., do not meet ordinance requirements.

2—The term "garbage" means all vegetable, fruit, meat, fish, and fowl waste but does NOT mean tin cans, broken glass or dishes, bottles or rubbish of any nature. Remember, the city's garbage is fed to hogs.

3—Place your garbage receptacle where it will be always free and ready of access to the collector, preferably near the rear door step. A garbage receptacle should never be kept indoors, nor should it be placed on any sidewalk, curb, street or other public property.

4—Your garbage receptacle should be kept clean, covered and in good repair, in such way as to prevent it and its contents from becoming offensive, or dangerous to your health and that of your neighbors. A receptacle thoroughly washed and cleaned after each collection will not only last longer but will materially improve sanitary conditions.

5—During freezing weather, the lining of your garbage receptacle with paper will permit it to be emptied without the necessity of banging it to loosen the contents.

6—The Garbage Department is endeavoring to make weekly collections. Report all complaints to the department office, 84 E. North Street, telephone, JEfferson 2616.

7—Report all small dead animals to the Garbage Department, giving the exact location of the same.

It is our intention to see that you receive adequate garbage collection.

Your full cooperation will materially assist in bringing about a systematic and more sanitary collection. May we have your support?

Respectfully,

LEE D. SCHROY, Mayor
City of Akron

The Protection of Concrete and Steel in Sewage-Treatment Plants

By DR. A. F. PISTOR
Chief Chemist, Inertol Co. Inc., New York City

PROTECTING concrete and steel in sewage works has always been a problem. Coatings that have proved satisfactory under normal conditions have not been found sufficient in sewage plants. The reason for this is that most paints cannot withstand constant condensation of moisture in the presence of aggressive sewage gases. The deterioration of concrete and corrosion of steel caused by these destructive forces is so serious that every sewage-works engineer must be on constant guard.

Paints used around sewage works must have the following essential qualities: (1) they must be permanently waterproof; (2) they must be acid- and alkali-proof; (3) they must be resistant to hydrogen sulphide. A distinction should be made between protective coatings for concrete and protective coatings for steel, since different factors have to be reckoned with on these surfaces.

Protection for Concrete

Concrete is not harmed by plain water. Only aggressive salts and gases dissolved in water attack concrete. It is therefore necessary to keep these destructive agents which are present in sewage from coming in contact with the concrete. This holds especially true for new concrete. During the first few years, new concrete is very vulnerable and should always be protected by a suitable coating. Such coatings will not only prevent grease and sewage from penetrating into the concrete and interfering with its ultimate strength and density, but will also facilitate cleaning sludge from the concrete. This is important for all tanks used in the primary treatment of sewage, and a protective coating is essential for all screening tanks, grit chambers, clarifiers, digesters and primary settling tanks.

A coating recommended for the protection of concrete under water should actually penetrate into the pores of the concrete in order to become a part of the structure. However, it should not be completely absorbed by the concrete, because a film of protective material is required to prevent actual contact between the cement and the aggressive water. By using a penetrating liquid, actual absorption of water is not fully prevented. The best material is a product which will penetrate slightly into the pores but at the same time form an uninterrupted protective film. It has been found that refined reinforced coal-tar paints serve this purpose adequately where their black color is not objectionable. For best results, three coats should be used, one penetrating primer and two finish coats. Where no abrasion occurs, the priming coat may be omitted.

Above water, the concrete is damaged by condensation, fumes and sewage spray. In fact, the exposed parts of sewage concrete structures are subject to severe abuse. One must not be surprised, therefore, that concrete will gradually become quite rough and porous and will develop small cracks which eventually lead to spalling. A black color is usually not wanted for such surfaces. Until recently, there was no solution to this problem. Oil paints recommended for this purpose were soon destroyed. Only the comparatively new synthetic enamels should be used and will give satisfactory protection if properly applied. It should be kept in mind, however, that very few of the large variety of colors usually available in enamels are suitable for conditions prevailing in sewage works. For exterior use, very light shades should be avoided. Solid colors such as white, red, maroon, light-green and aluminum should be selected.

Protecting Steel

In protecting steel, more or less the same factors apply, but, in addition, several other contributing forces have to be considered. Under exposed conditions, the attack on iron and steel is much more severe than on concrete. The destruction proceeds much quicker because atmospheric corrosion plays a major role, and therefore the selection of the proper type of protective coating is of utmost importance.

On interior steel surfaces or steel submerged in sewage, reinforced coal-tar coatings are satisfactory, provided the concentration of sewage gas is not too strong. Severe corrosive conditions, frequently indicated by a pronounced odor of sewage gas, call for more resistant paints. If, in addition to moisture and corrosive gases, the steel is exposed to sunlight, coal-tar paints are not very satisfactory on account of their alligatoring. Asphalt paints are not sufficiently waterproof in the thin film in which they must necessarily be applied as a paint, and they are even more affected by sunlight than coal-tar paints. Therefore, where a pleasing color effect is desired and strong resistance is essential, synthetic resin enamels should be used. Not all the paints sold under the name of synthetic enamels are suitable as protective coatings in sewage plants.

Testing a Coating

A simple test along the following lines is suggested to prove the value of a coating: Two coats of the clear base paint should be applied to three glass plates with 24 hours' drying time between coats. Seven days after the second coat has been applied, the coating on the first panel should be exposed to 40 per cent sulphuric acid, the coating on the second panel to 10 per cent hydrochloric acid, and the third panel to 5 per cent sodium hydroxide. The test should be made by putting a few drops of these chemicals on the coating applied to the glass plate and by covering the chemicals with a watch crystal. If no

peeling, blistering or other outward sign of disintegration of the coating has occurred at the end of ten days, the material can be considered satisfactory.

Applying Paints

As far as the selection of colors is concerned, the very light tints should be limited to interior application. Next to the selection of the proper type of protective coating, the preparation of the surfaces and the application of the paint itself is of prime importance. This is often overlooked, although careless and faulty application frequently affects the performance of a good coating to such an extent that the paint manufacturer is sometimes accused of furnishing a defective material.

When painting new concrete, all that is necessary is to have a dry and dust-free surface. Concrete surfaces having a very smooth finish should be etched before painting. Old concrete should be thoroughly hosed down and wire-brushed. If not all grease can be removed in this manner, the surfaces should be scrubbed with a solution of 1½ ounces of trisodium phosphate and 1½ ounces of soap chips in a gallon of warm water. This solution will cut the grease and render the concrete perfectly clean. After the concrete has been rinsed and allowed to dry, the protective coating is applied by brush or spray gun. In covered tanks without much ventilation, it is often necessary to keep a coal fire burning to obtain a sufficiently dry surface.

In painting iron and steel, the surfaces should be cleaned of all rust, dirt, oil and grease. Old paint remnants must be thoroughly scraped and wire-brushed, for they frequently cover up corrosion which has already started underneath. Bolts, nuts, edges, and corners should be given particular care, since that is where future corrosion will set in. Oils and greases can be washed off with gasoline and similar solvents.

Old paint remnants may be removed either mechanically with scraper and brush or chemically with paint removers or any caustic solution. Under certain conditions, burning off the old paint may also be considered. The de-rusting of the iron and steel may be done by hand or machine. If corrosion has not progressed very far, the use of a machine is hardly superior to treatment by hand. The latter may be done with hammer and wire brush. For the mechanical treatment, usually a rotating power brush and vibrator is used. Where corrosion is very bad, sandblasting is particularly effective. Only very fine sand should be used, however, since coarse particles have been known to become embedded in the metal surface. The dust resulting from sandblasting must be removed immediately with soft brooms, for it encourages new corrosion. The mill scale must be removed under all conditions, since it is bound to scale off in time, taking the paint along with it. Besides, any paint will have a better bond on the iron and steel itself than on the mill scale. After the cleaning of the surfaces has been completed and the dust has been carefully brushed off, the first coat should be applied as promptly as possible and in turn should be followed by a second and third coat with the least delay; only the whole treatment will give the desired protection. Corners and narrow passages, which are nearly inaccessible and difficult to clean and paint, should be filled with a suitable plastic or putty.

The surfaces to be painted must be perfectly dry. This is of greatest importance. Equipment which is always exposed to spray or on which moisture will condense continuously may be dried with a blow-torch. Occasionally, it has been found of advantage to cover moist steel surfaces with cement, which, however, must be wiped off completely as soon as it has absorbed the moisture. These are of course only emergency measures, and as a rule a dry surface should be obtained in the usual manner. No work should be done while there is a chance of fog or moist air condensing on the structures. It is a good rule not to start painting outdoors until three hours after sunrise. If the work is interrupted by fog or rain, it should not be resumed until all of the surface has become thoroughly dry again. Quite frequently painting is started when 90 per cent of the surface is dry, while the remaining 10 per cent is made up of nooks and corners in which moisture is still present. Failure to wait until all such surfaces have become thoroughly dry may spoil the whole paint job.

Another point of primary importance is the old rule that a single coating is wasted. Two coats are the minimum and three coats desirable for best results, especially under the serious conditions existing in sewage plants. No painter has ever been able to apply a coat of paint absolutely free of pores, on account of the fact that some air always gets into the brush and the paint film. This air when escaping from the freshly applied paint coating leaves small pinholes, sometimes noticeable with the naked eye and sometimes visible only through the microscope. However, they are always present, and unless a second coat covers the pinholes, corrosion will set in again rapidly. In view of the difficulties attending the painting of sewage structures, more pores in the films are to be anticipated and therefore a third coat is essential for best results.

An Extra Coat on Thin Edges

Any paint of average consistency will result in a very thin film. This film is stretched out even more in painting edges and sharp corners of thin steel, such as used for sewage-treatment apparatus. However, such places are usually subjected to more wear than the general painting surface. All corners, edges, rivets and bolts should therefore be gone over with a liberal coat of paint after the painting of the general surfaces has been completed. The importance of this point cannot be stressed too much, because once corrosion has started, the battle is already half lost. Since rust has a larger volume than the iron from which it is formed by oxidation, it has a tendency to lift off the paint film along the edges of a rust blister and to increase its area constantly. As a result, a perfect paint job may come to a short end by the failure to cover up carefully a few weak points in the entire treatment. It may hardly be necessary to point out in this connection that the cost of the paint and the labor in applying it on a clean surface is the smallest item, and that most money is usually spent in preparing a certain area for painting. Therefore, a little extra time spent in applying the paint carefully and in the necessary thickness is a good investment.

There is no getting away from the simple fact that the more area a gallon of paint is made to cover, the thinner will be the protective film resulting therefrom. For combating corrosion under serious conditions such as exist in sewage-treatment works, the thicker the protective coat-

ing, the longer it will last, provided it is at the same time sufficiently elastic and able to meet the conditions in regard to chemical resistance.

Repainting

As far as the renewal of a paint coating is concerned, it is very costly to wait until the old paint is 25 to 50 per cent gone, for by that time deep pits and scale will have formed where the corrosion started. The best method is to break rust blisters open and to spot-paint them as soon as they appear. If they become so numerous as to make up 5 or 10 per cent of the surface, it is time to give the entire area two new coats of paint after priming the bare spots. In this manner, the structural strength of the steel will be diminished but slightly in the course of time, and the repaint job will always be much less expensive than it would be if the steel were allowed to become rough and pitted. In the design of sewage-plant apparatus in particular, very little allowance is made for a reduction of the strength of the steel by corrosion.

Recommendations

There is no question that by following the foregoing suggestions good painting results can be obtained in sewage plants. One should never lose sight of the fact, however, that more severe conditions have to be combated in sewage plants than under normal conditions, and it will be necessary to select protective coatings which have been specially designed to meet these conditions. To use an inferior paint in sewage plants has never paid and will never pay. If special painting problems are encountered, it is best to obtain recommendations from a responsible paint manufacturer specializing in such coatings. Usually these firms have special service departments which will be glad to give proper advice based on their long experience in this field.

What the City of Memphis Does for the Citizens in Return for Their Tax Money

City Contacts During the Daily Life of a Family

WHERE YOUR MONEY GOES

How many times a day do you use your city's tax-supported services? What does the City of Memphis do for you in return for these dollars you pay over the tax counter?

Paying your city taxes today, maybe you've asked yourself these questions. Here's an answer from Mayor Watkins Overton, who has tabulated city contacts in the daily life of typical Memphians.

This is the story of the Smiths, an average Memphis family.

The Smiths live in a modern bungalow, have two children in school, and own a medium-priced car. Not rich, not poor, they're thrifty enough to save, American enough to spend what it takes for well balanced living. Maybe they're the folks next door. Maybe they're you.

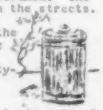
B'r-r-r goes the alarm clock at 6 a.m. Mr. Smith slips out and brings in the milk. His great-grandfather died in a typhoid epidemic caused by contaminated milk, -- but Mr. Smith won't. City health department has been on the job from a cow in a Mississippi pasture right up to his doorstep.

That goes, too, for the Smiths' breakfast bacon, dinner steak, Sunday roast, and all the food they buy from city-inspected stores and markets.

Mrs. Smith turns a tap in the kitchen sink, and out comes pure artesian water. She flicks a switch, and TVA current flows into her toaster. Like other Memphians, she is a customer of two big municipal utilities in which she is part owner.

The family hurries into its car (inspected by the city for safety) and drives off over pavements laid and maintained by the city. Mrs. Smith takes her husband to the office, stopping for traffic lights, then lets out the children at the public school.

A fire engine clangs past, not to her house this time, -- but what if it were? Mrs. Smith is glad to see the efficient, speedy trucks with their loads of trained firemen. She passes, too, a white wing man, brushing up litter from the streets.



Back home again, she finds the public works truck calling for her garbage. While she goes about the day's household duties, Mr. Smith is shooting up ten stories to his office, riding in a city-inspected elevator.

Mrs. Smith answers her doorbell. Malaria control division has sent an inspector to investigate her complaint about mosquitoes. She accompanies him round the house and he finds the trouble in her garden pool, gives her a spraying formula.

Downtown is a bargain said. Mrs. Smith takes the bus, a public utility regulated by her city government, because it's comfortable and saves parking worry. While in town, she pays her gas, electric, and telephone bills, reduced twice in recent years by the same municipal regulation.

Noting that it's a tag day, she donates, because she knows that only worthwhile charities are given permits to solicit. Next she stops at Cossitt Library, where she borrows a new cookbook, a novel, a book on accounting for her husband, who is "getting ahead" by studying that subject at the city's vocational night school. She also selects a juvenile story for the children and a new volume that will get Junior more interested in his geography.

With her bundles, she decides to go home in a taxi, which, by the way, is inspected, and its operator licensed, by the city. In her travels, she has passed under dozens of overhanging signs without giving them a thought. She knows that municipal authority has had an eye on their hanging.

She rides home, over a new concrete viaduct out her way, instead of across the railroad tracks. In her neighborhood she finds the streets cool and wet. The flusher has been by and the dust is gone.

In come the children from school! Before she knows it, they've grabbed a sandwich and are off again to the nearby playground. She herself goes out to her sewing club's meeting at the community center. Tomorrow she has a date with the City Beautiful Commission's group in her ward -- they'll discuss ways of planting the home grounds.

After dinner, as street lights flash on in the dusk outside the Smith home, the family sets out in quest of recreation. The motion picture house they visit is regulated by the city for safety and the operator is a licensed expert who has passed municipal examinations. Last week the Smiths attended summer opera in the recently built Overton Park outdoor theater.

Sometimes it's a dip in the municipal swimming pool, sometimes a drive thru the parks, a picnic under the trees, or an excursion to the municipal airport. Sunday afternoons spell a trip to the Zoo, the municipal museum, or the art gallery. Maybe the playground or community center is giving a party.

The Smiths' last glimpse thru the window that night, as they end another day, reveals the police cruiser passing on its 24-hour, radio-directed, vigil.

Some things, of course, affect the Smiths less tangibly than these everyday services. They may not be vividly aware of dredges plying in the harbor, city planners bent over maps, detectives studying criminal records, witnesses droning in city court. Yet the Smiths would be back on the frontier in lawless and uncivilized surroundings if the community failed to carry on these wider activities.

Should the Smiths have a "rainy day", they may need other services -- free hospitalization, clinic services, a public health nurse, or aid from the employment center in finding the breadwinner another job. Hundreds of their fellow citizens, however, are already kept from disaster by such community cooperation -- and that makes a difference to the Smiths, whether they know it or not.

You can't cram all the city's services into just one day with the Smiths. There are a lot of things left over, from building supervision to flood control, and a score of invisible agencies, like culverts and sewers.

But just from this clock-face view, thru the door of a typical Memphis home, doesn't an average day prove that your city tax dollar buys more bargains than any dollar you spend?

MAYOR WATKINS OVERTON OF MEMPHIS, TENN., EXPLAINS IN A MIMEOGRAPHED LETTER TO THE CITIZENS THE BARGAINS THAT THE TAX DOLLAR BUYS

Experimental Seal on Airport Runways

Tests for Satisfactory Seal for Mixed-in-Place Runways at Glynn County Airport, Georgia

MALCOLM McKINNON FIELD, the 357-acre airport of Glynn County just northeast of Brunswick, Ga., is nearing completion, but its 103,000 square yards of sand-tar mixed-in-place runways, dried out under the hot sun, so that all ductility has disappeared in the surface and the material is quite friable. The tar was applied at 2 to 3 gallons per square yard for a 6-inch mix.

Experimental rectangular areas 18 feet wide and of different lengths were laid out on the south edge of Runway No. 1 east of the hangar, and experimental seals applied, using 150 and 200 penetration asphalt and varying quantities of different sands as blotters. The local sand is extremely fine, with 80 per cent passing an 80-mesh sieve and 2 per cent passing a 200-mesh sieve, while two coarser sands were imported from the Altamaha and Satilla Rivers.

The Experimental Seals

As stated above, the rectangular areas are uniformly 18 feet wide and of varying lengths, as shown in the paragraphs below:

No. 1 is 38 feet long, giving 76 square yards treated with 0.38-gallon of 150 penetration asphalt and 5.3 pounds per square yard of Altamaha River sand.

No. 2 is 12 feet long, giving 24 square yards treated with 0.50-gallon of 150 penetration asphalt and 5 pounds of local sand per square yard.

No. 3 is 25 feet long, giving 50 square yards treated with 0.42-gallon of 150 penetration asphalt and 4.5 pounds of local sand per square yard.

No. 4 is 11 feet long, giving 22 square yards treated with 0.41-gallon of 200 penetration asphalt and 9 pounds of Altamaha River sand per square yard.

No. 5 is 14 feet long, giving 28 square yards treated with 0.32-gallon of 200 penetration asphalt and 4 pounds of local sand per square yard.

No. 6 is 14 feet long, giving 28 square yards treated with 0.30-gallon of 200 penetration asphalt and 6 pounds of Satilla River sand per square yard.

No. 7 is 36 feet long, giving 72 square yards treated with 0.43-gallon of 200 penetration asphalt and 6 pounds of Satilla River sand per square yard.

No. 8 is 16 feet long giving 36 square yards treated with 0.42-gallon of 150 penetration asphalt and 5.5 pounds of Altamaha River sand per square yard.

Experimental seals No. 2 and 3 give the richest tops, excellent for runways which do not have the traffic of highways. These would shove badly under heavy traffic, but under the traffic and sun conditions of an airport runway will give a seal that will not have to be done over again for three or more years. The local sand has given good results as a blotter, so that there will be a saving of nearly $1,000 in the blotter alone through the use of this sand from a knob within the airport boundaries instead of paying for imported sand from commercial producers.

AIR VIEW OF THE GLYNN COUNTY AIRPORT ON ST. SIMONS ISLAND, NEAR BRUNSWICK, GA.

The Airport

The Glynn County airport has been built largely with WPA labor and replaces an earlier and much smaller airport located about ¼-mile away on the same island, St. Simons. The three runways in the directions of the three prevailing winds, according to the wind-rose, average 3,000 feet in length and are each 100 feet wide. The runways and the field are protected with range and boundary lights and obstruction lights. An electric transmission line along one side of the field is being placed underground to prevent any possible accident through a low take-off. The area beyond the runways has been cleared for a distance of 600 to 1,100 feet and to a width of 500 feet to permit emergency landings in case of engine trouble at the take-off, as recommended by the Bureau of Air Commerce.

The entire field had to be cleared of a heavy growth of trees and brush before grading could be started. The project was sponsored by the county, with WPA labor. Tile underdrains have been laid in all low spots and carried to lateral open ditches at the edge of the field.

A steel hangar for local planes has been erected, and is equipped with a rolling door of eight panels, giving a free opening of 80 feet and 18 feet high. The hangar itself is 80 feet square with a lean-to office and workrooms at the back. The entire hangar is well lighted. A concrete apron in front of the hangar is 50 feet deep and flared at the ends for the moving of planes.

Adjacent to the hangar is the Bureau of Air Commerce Building, which also contains the waiting and rest rooms.

THE HANGAR AND BEACON AT MALCOLM McKINNON FIELD, THE AIRPORT OF GLYNN COUNTY, GEORGIA

Fertilizing the Grass

In order to determine the best method of insuring a sturdy, thick growth of grass over the entire area of the field outside the runways, certain areas have been treated with different fertilizers to ascertain their efficiencies and to aid in deciding whether fertilizers are really needed. Bermuda grass was planted over the entire area but not fertilized. The experimental areas were treated at the rate of 300 pounds per acre with 7-5-5 fertilizer, a fish-scrap product, and another section at the same rate with nitrate of soda. The latter gave a quick, rich growth of sturdy green grass, while the other showed some benefit. The observations will be continued for some time to determine whether the nitrate was a flashy growth or whether the runners which showed up immediately will spread the grass over the bare spots and speed up the covering of the entire area. It is thought also that the fish-scrap fertilizer may be slower in action and may in the long run show to better advantage than it has thus far. It is also possible that since the entire field a little over a year ago was covered with a thick growth of trees and brush, there may be a sufficient amount of natural humus in the sandy soil to support the grass, with a reduced quantity of fertilizer. Only a longer period of observation can give the complete answer to this problem, so the motto at the airport now is "Wait and see." Other airport officials are also watching this experiment with a great deal of interest after having spent considerable money in plantings that did not produce satisfactory turf.

The operation of the Malcolm McKinnon Field is under the direction of Harry Smith, Airport Manager, and the construction and experimental work under way and described in this article is under the supervision of H. J. Friedman, County Engineer of Glynn County, Brunswick, Georgia.

T. R. K.—706.

THE G. R. A. DIRECTORY, 1938-39

The Governmental Research Association (1313 East 60th Street, Chicago) has brought up to August its directory of organizations engaged in governmental research. The list covers: local agencies (on city, county, or metropolitan area bases); state agencies, including colleges and universities; national agencies; foreign and international agencies (a partial list); other members of GRA. More than 500 organizations and institutions are listed—at least one for every state and the territory of Hawaii, except Wyoming. Price, $1.00.

Municipal Ordinance Codification and Revision

Assistance Available from Leagues of Municipalities and Other Sources

By AMBROSE FULLER
Consultant, American Municipal Association

AN OCCASIONAL humorous newspaper reference to a municipal ordinance of the "horse and buggy" variety keeps the public informed that laws and ordinances have a way of getting out of date. To local government officials such occasions are not humorous. An adequate set of up-to-date ordinances available for public scrutiny are important to every municipal corporation regardless of its size. Most public corporations find it necessary to regulate local activities in various ways. Health must be preserved, safety of life and limb guarded, traffic regulated, the services of the city utilities have to be controlled, property users supervised, and business enterprises regulated. This is usually done by the adoption of ordinances and by the promulgation of regulations pursuant thereto. As a result, unless care is exercised, ordinances soon become so numerous and extensive that they cause confusion in the minds of those charged with their recording and enforcement.

The weight of numbers of ordinances alone is not the sole factor contributing to confusion. The very number and the highly technical nature of services performed by municipalities, in addition to making many ordinances necessary, often leads to their inadequacy in many ways. Many perplexing situations are bound to arise. Instances have been known where small cities were enforcing ordinances which they did not have on their books. Thus, one small city was requiring a building permit for the construction of buildings in the city and was making detailed inspections of construction work without a building code in any form. Other cities have been found to be regulating traffic and the activities of transient vendors without adopting the required ordinances. Instances have been known where inappropriate provisions have crept into ordinances which have been copied from another city or from a suggested "model" ordinance. Ordinances are sometimes adopted to meet a temporary fad like miniature golf courses and left to clutter up the code long after the fad has been forgotten. The public often demands that its governing bodies of municipalities meet new situations swiftly, sometimes without adequate time for study of the situation and before all the factors are clearly visible. Examples of such haste occurred in legalizing liquor and, in one or two cases, in the introduction of parking meters.

Systematic Recodification and Modernization Essential

Even if no litigation arises out of a city's ordinances, continuous attention must be directed to keeping them up to date and available to the public. Ordinances must be systematically revised, recodified, and modernized. The periodic work done on ordinance codes falls into four classifications:

1. The preparation of new ordinances to meet new needs.
2. The preparation of administrative codes or their revision in connection with a reorganization of the city government or some of its departments.
3. Compilation and codification.
4. Revision and modernization.

Attention has been directed to this subject in recent years by numerous organizations. Leagues of municipalities have been assisting their members with ordinance work in various ways for several years. Trade and technical associations have found this work important enough to direct some attention to it.

When cities once find themselves with adequate and satisfactory ordinance codes, complete as to substance and properly arranged, it is reasonably simple to keep them in that situation with the usual staff of city employees. This makes it easier to amend, repeal, and withdraw ordinances. As they become outmoded they can be amended or repealed outright, and the records corrected accordingly. New ordinances can be supplied, after proper consideration, to meet new requirements. A printed code can thus be kept up to date by annotating and reprinting periodically. Many of the larger cities follow this method. Some cities find reprinting expensive and are considering the adoption of a loose-leaf system. Such a system is in effect in a few cities and is at present being studied by the corporation counsel of Chicago for use in that office.

The preparation of administrative codes is a technical job. An administrative code provides for the departmental organization and functioning of a city government, including also personnel work, budgeting and accounting, and purchasing, all tools of management or administrative control. Administrative code changes properly follow the reorganization of a city government occasioned by the adoption of a new charter or by the rearrangement of functions of the city under the authority of an existing city charter or state law. Such a complete administrative code was recently prepared by Public Administration Service for the city of Wheeling, West Virginia, to make effective the reorganization of the city government under its new charter. Several other codes have been drafted or revised recently, indicating a general improvement in municipal administrative machinery.

From the standpoint of volume, probably the most important municipal ordinances are the regulatory and penal ordinances. Broad administrative changes are seldom made in such ordinances, but detailed adjustments are needed almost continually. Even in the cities having

the most up-to-date codes there is usually some codification or revision needed in regulatory and penal ordinances. A large number of such revisions and codifications are in progress at the present time.

Procedure in Codification

Valid ordinances are legal enactments. Consequently, technical legal service is needed. As the first step in ordinance codification, all records should be searched, and all active ordinances still applicable and in effect should be listed and included. Where parts of ordinances have been amended, they should be recopied with only the effective parts included. Also those that have been invalidated by the action of the state legislature or some administrative agency of the state, or by a decision of court, should be noted and not included in the code. The effective ordinances should then be typed and arranged in some logical or convenient order. When such order is agreed upon the ordinances should be indexed and cross-indexed by subjects and, if necessary, coded by number.

Leagues of municipalities have been offering codification services to their member cities for several years, but their main interest has been in supplying trained technical services in connection with other types of ordinance review and revision work. Considerable impetus has been given to this work during the past year or two by the availability of NYA and WPA funds. This type of project is recommended by the professional divisions of these two Federal relief agencies. The University of Oregon and the League of Oregon Cities are cooperating in sponsoring codifications in ten or more of the cities of Oregon. Reports from that state indicate that the sponsors of the project there are well satisfied with the results being secured. Other state leagues are preparing to sponsor ordinance codifications in several of their cities. These include Montana, North Dakota and Utah and probably others. Reports indicate that many cities are now carrying on codification work independently as WPA or NYA projects. Labor is the major item of expense, sponsors' shares being made up of such items as office rent, supervision, typewriters, paper and other supplies. The ultimate value of these projects will probably depend in the last analysis upon the quality of the workers assigned to the project, and more especially upon careful supervision of the work.

Repeal or Revision of Obsolete Ordinances

The work of revision of ordinances or codes of ordinances, as indicated above, is more difficult and requires more technical service than codification. Ordinarily the work of revision would proceed much the same as in the case of codification up to the point where the ordinances are collected and retyped with repealed or superseded sections removed. At this point further consideration would be given to the ordinances to determine which ones are obsolete. Such ordinances should be listed for repeal. Consideration should also be given to the substance of existing ordinances. Those not properly covering the subject matter should be modernized or revised to fit the requirements of the municipality more fully. In the case of subjects not covered in the code, new ordinances should be prepared and included. To be effective, all adoptions and repeals must be formal.

Many sources of help are available in the revision of old ordinances or the preparation of new ones. Committees and staff members of the various leagues of municipalities have in most states prepared model or suggested ordinances on many subjects. National technical organizations have prepared model codes in many fields and stand ready to assist in their adaptation and application. These organizations include the National Board of Fire Underwriters, the National Fire Protection Association, Building Officials Associations, American Public Health Association, American Society of Heating and Ventilating Engineers, and many others. Many public agencies and departments have proposed regulations and suggested codes covering various subjects which are available to city officials also, these including the U. S. Public Health Service with its proposed milk-grading ordinance and inspection and grading code, the U. S. Department of Commerce with its recommended building code and zoning legislation, and the U. S. Bureau of Mines with its safety and smoke prevention codes.

Most of the model code material is available through the league offices of the several states. In fact, the technical staffs of several states have adopted much of this model material into workable local ordinances, and in some cases have incorporated it and used it in code revisions. Leagues of municipalities offer revision services to their members. The League of Minnesota Municipalities, for example, has made complete code revisions for twenty cities and villages in that state. In some of these places all old ordinances were repealed and a complete set of new ordinances was adopted, with the exception of franchise, street dedication and similar ordinances.

Putting WPA Surveys to Effective Use

IN a recent news letter the American Municipal Association calls special attention to the fact that much useful municipal work of a survey nature may be carried on as white collar projects under the WPA program. "For projects of this sort," says the AMA statement, "the sponsoring municipal agency must furnish a thoroughly competent technical supervisor. The WPA is willing to supply the man-power. Another primary regulation is that no project will be approved that is regarded as a normal function of the city. Examples of the work that may be undertaken include such projects as tax-delinquency studies, the installation of a new record and procedure for real property valuation, surveys to determine the effects of homestead exemption laws on municipal income, and research concerning the operating results of parking meters.

"That land values in an area are increased after a public housing project has been built, is a theory often advanced by Federal housing agencies. It is claimed that recent studies in cities in which these projects have been built tend to bear out this theory. In one city it is reported that property in the vicinity of a project built under the PWA housing program was improved so much that the local government gained three times as much in increased taxes as the amount involved in tax exemption conferred on the project. In this particular case, the project was built on vacant land so that it was more the matter of opening up a new section than the rehabilitation of an existing one. Because there is still much to be learned on this whole subject, it has been suggested that municipal officials may well avail themselves of the opportunity of carrying on research under white collar projects. Studies could be made showing the effects of tax exemption as applied to public housing projects as far as the financial position of the city as a whole is concerned."

New Frontiers for Bridgeport

By A. W. von STRUVE

THE development of the city of Bridgeport through projects of the Works Progress Administration is a story of new frontiers, for the area has been virtually expanded by making hundreds of desirable home sites available through the many new highway projects completed or now under construction. Health and comfort standards have been improved by approximately 50,000 linear feet of new sanitary and storm-water sewers. Many public school buildings have been repaired and improved from basement to roof. An addition to Englewood Hospital, greatly extended recreational facilities, a considerably enlarged airport, and repairs and improvements to public buildings other than schools, were included.

A total of $4,663,766 was expended in Bridgeport through the WPA from the inception of the program through the spring of 1938. To this sum the city has added $982,149 in sponsor's contributions, making a total of $5,645,915.

The projects are varied. Some of them are of the "showy" type, such as the esplanades and other highway work. Other accomplishments, equally important, may be more or less hidden from public view, yet they have constituted a large part of the program. Particularly in this category are the many school improvements.

School Improvements

Of Bridgeport's 30 public school buildings, 36 have been benefited in one way or another. All needed painting inside and out to some degree; roofs were leaky, heating systems inadequate because of clogged and rusted pipes and other conditions; floors and stairs were so worn as to be an accident hazard; cornices were rotting away, leaders and gutters rusted out; and in many instances sanitary facilities were a health menace. These major problems were accompanied by many minor, yet important, needs. A tour of inspection today gives ample justification of the

AT LEFT—
COMPLETED ESPLANADE
ON NORTH PARK
AVENUE,
BRIDGEPORT,
CONN.

AT RIGHT—
NEW PAVING AND CURBS
ON DRIVES
IN SEASIDE PARK,
BRIDGEPORT

expenditures which have made the buildings in which the children spend so much of their time, safe, clean and comfortable.

Sewers and Highways

Many of the sewer projects have been costly because of difficult rock excavation. Sanitary sewers and storm-water sewer projects have cost $745,000—admittedly worthy undertakings, raising the community health standards.

Miles of new highway have been built, and many important arteries have been reconstructed, some of the work extremely difficult. Adding much to the city's safety in the facilitation of pedestrian and vehicular traffic are the thousands of square feet of new sidewalks, and the modern traffic safeguards, the highway esplanades. Thus the accident prevention angle enters into work relief. Much of this highway work has followed closely the elimination of street-car service.

Another building project is the fine stone garage housing the city's Sanitation Department trucks. It includes facilities for sterilizing the garbage trucks, pits for working underneath them, shower rooms for the men, office space—a complete plant for the purpose.

Recreation

Chief among the new recreational facilities is the development of 90 Acres Park, in which numerous picnic spots have been fitted up with tables, benches, fireplaces and other necessary adjuncts. In this park a modern swimming pool is under construction, and in Fairchild-Wheeler Park nine holes are being added to the municipal golf course.

Technical and Professional Work

The general problem of relief probably reaches no more acute proportions than in providing the so-called "white collar" class with useful work projects. Bridgeport has been fortunate in finding a great number of worthy undertakings suited to the talents of this class. They vary from the more involved type requirements of technical or professional knowledge in one subject or another, to the simpler tasks of indexing various city records. Responsible sources have attested the value of the work performed in this city.

Sewing Projects

Serving the multiple purpose of providing useful work for many women, developing and preserving their skills, furnishing garments for the city's needy and thus relieving the Welfare Department's clothing budget, Bridgeport's sewing projects have given excellent account of themselves. A total of nearly 200,000 garments, including all sorts of men's, women's and children's apparel and accessories, have been made. The products of this work are all turned over to the local Welfare Department, which gives them to persons most in need.

The Symphony Orchestra

No story of work relief accomplishments in Bridgeport would be complete without mention of the Bridgeport Symphony Orchestra. This 80-piece unit of the Federal Music Project has given a number of excellent concerts. Thus work has been provided for many trained musicians, and hours of enjoyment given to music lovers. As a contribution to the city's cultural and intellectual pleasures, the offerings of this group of musicians, both solo and ensemble, have been of an extremely high order.

It seems obvious that the entire program has had a salutary effect on this city. Through cooperation from and with the Works Progress Administration Bridgeport has received many fine, permanent public improvements, the while the projects have had a desirable effect upon the city's collective tax pocketbook. That is precisely what has been accomplished—many public improvements and saving money at the same time. In seeing that the money was put to good use, Mayor Jasper McLevy and his administration have played an important part. Most of the projects were planned by the local administration and carefully supervised from start to finish. Bridgeport may claim to be one of the cities that have made the most profitable use of funds possible under the system.

"Pretty Nearly Ruined the Town"

WILLIAM ROCKHILL NELSON, former editor of the *Kansas City Star*, was an ardent campaigner for reforms. The new book on the Kansas City ten-year plan, "Where These Rocky Bluffs Meet" (see page 111 of this issue), reprints the following humorous editorial from the *Star* on Colonel Nelson's vigorous and vital leadership:

"Under the malign direction of Nelson, the *Star* has kept things constantly stirred up. It has made tenants dissatisfied. They never used to complain about light and air. Now they won't look at a house unless every window opens on a flower garden with a humming bird in it. The *Star* won't let anybody alone. It insists on regulating the minutest detail of people's lives. Its regulations are pernicious and extravagant. Its preaching about more parks and boulevards and breathing spaces and supervised playgrounds for children, and plant Dorothy Perkins roses, and swat the fly, and housing reforms, and a new charter, and art galleries, and keep your lawn trimmed, and take a lot of baths, and throw out the bosses, and use the river, and cut the weeds on vacant lots, and read the Home University library, and for God's sake don't build such ugly houses, and make the landlord cut a window in the bathroom, and put goats in Swope Park, and why will mothers risk their babies' lives by bringing them up on bottles, and plant your bulbs now, and teach your children manners, and what's the use of lawyers, and cultivate a pleasant speaking voice, and build a civic center, and put out houses for the birds, ... and cut out the children's adenoids, and build trafficways, and sleep with your windows open, and the square deal, and build cyclone-proof houses, and smash the saloons, and pooh, pooh on factories that employ women, and reduce the street car fares, and go look at Old Masters every Sunday, and use two-by-sixes instead of two-by-fours if you want your house to stand up, and move out in the suburbs, and tear down the tin bridges, and build hard surface roads everywhere, and all the other things, has increased the cost of living and given people inflated ideas, and pretty nearly ruined the town."

It's the Same Old Story

WHY IS IT THAT SO MANY OF OUR SMALLER CITIES WILL SPEND A FORTUNE BUILDING A FINE MAIN THOROUGHFARE...
- CLEAN IT REGULARLY WITH EQUIPMENT THAT WOULD MAKE SOME LARGE CITIES TURN GREEN WITH ENVY..
- AND THEN FORGET ALL ABOUT KEEPING IT OPEN AND SAFE DURING THE WINTER?
GENE MARRIN

Winter Street Maintenance in a Small Iowa City

"Our Streets Will Be Kept Open and Safe"

By F. S. NAIDEN
City Engineer, Marshalltown, Iowa

AS in most cities of its size, Marshalltown is short of money to meet all the demands for street maintenance, including snow removal. But we actually do keep all our streets open in winter, including all the residential district, and we do it on the smallest allotment of any first-class city in Iowa. Our total maintenance fund is $13,500, giving us only 77 cents per capita for our 17,500 population. Marshalltown is located about 55 miles northwest of Des Moines, in central Iowa, and has about 48 miles of paved streets, 5 miles of gravel streets and 9 miles of dirt streets.

Business and Residential Districts

In the business district of Marshalltown all snow must be hauled about one mile, because the district is on the top of the divide and there are no large sewers into which the snow may be dumped. In this district we attempt to remove all snow, and do remove most of it in the retail district within a very short time. Some of the side streets of the business district have to wait a few days for the actual hauling, but the snow is all plowed to the curb promptly. Where we do not get all the snow with the plows and the remainder gets tramped under traffic, we cinder or sand the streets until it is possible to make a final clean-up.

In the residential district the snow is plowed to the curbs and left. We open, and keep open, every street in both the business and the residential districts.

Special Problems

The time of day or night during which the snowfall takes place makes considerable difference in the time of removal. If the storm takes place during ordinary business hours, it is almost impossible to do much plowing or to keep the snow from being packed by traffic. If the snow is at night or on Sunday, we can usually get most of the streets of the business district plowed before the traffic becomes too congested.

A definite endeavor is made to secure the cooperation of merchants in leaving the snow from the sidewalks on the walk at the curb, so that the city can pick it up without its getting packed in the streets. Since it is impossible to see each merchant after each snowstorm, we have not yet succeeded in securing full cooperation in this respect. At such places as the Court-House the snow is shoveled onto the lawn instead of into the street, so that it will not be necessary to haul it.

Equipment

The snow-removal equipment owned by the city of Marshalltown prior to 1938 consisted of a 7-foot Austin-Western side discharge snow-plow mounted on a 1½-ton International truck, a Caterpillar Thirty tractor and a 10-foot Caterpillar blade, with two trucks and such additional trucks as were hired for hauling.

During the winter of 1937-38 the city added another piece of equipment, a Caterpillar Auto Patrol with a V-plow and a 12-foot blade. This equipment simplifies snow removal in the business district, since it is powerful enough and heavy enough to actually blade most of the snow to the curbs, so that if we get on the job reasonably early, which we do in most instances, we can actually clear the streets by plowing and blading closer to the surface than we possibly could with the older truck plow. The maintainer did everything we expected and, as it was heavy and powerful enough to move packed snow on the streets where we had heavy traffic, it materially reduced time and cost. We no longer used the tractor and blade after getting the maintainer. It will be necessary to hire some additional trucks and hand shovelers, but all other plowing and blade work will be done by the regular crew.

Sanding

It is just as important—maybe more important—to reduce the hazards of ice as it is to remove the snow from our city streets. We make it a practice to sand or cinder all slippery places on all streets, whether business or residential. On the streets we use a lime spreader or a cinder machine with either the sand or the cinders. In the business district we use about 200 pounds of calcium chloride per cubic yard of sand or cinders, sand being preferred. On street intersections we supplement the spreader with hand spreaders.

Taxes Aid Low-Cost Housing in Toronto

IT does not seem to be generally known that Toronto has had in effect since 1922, with apparent success, a by-law which provides that taxes and rates (except for school purposes) on dwelling houses assessed for not more than $4,000 shall be levied and imposed as follows:

On dwellings assessed for	Percentage of value to be taxed
$2,000 or less	50 per cent
2,001—2,500	60 " "
2,501—3,000	70 " "
3,001—3,500	80 " "
3,501—4,000	90 " "

The total taxable real estate assessment of the city for 1938 is $365,849,307 for land, $495,467,731 for buildings. Of the latter, $71,632,713 represents the exemption on the assessed value of dwellings under the above-mentioned by-law.

46 Per Cent Fewer Accidents on Hartford's Relighted Streets

By R. E. SIMPSON
Consulting Illuminating Engineer, West Hartford, Conn.

"A COMMUNITY pays for good street lighting whether it gets it or not."

Mr. Citizen has the choice, or the choice is made for him by the city officials, of paying the bill for *good* street lighting and enjoying the accompanying comfort, convenience and safety, or paying a smaller bill for *poor* street lighting plus a larger one to cover the cost of excess night accidents. In either case, however, it is the citizen who pays the bill.

City officials generally are reluctant about improving street lighting, largely because of the cost item. This item appears in the budget, where all who care may see and criticize. It is a definite tangible charge which the citizens must pay. Not so evident to city officials or the average citizen is the possibility of a community having good street lighting and paying the entire cost out of the savings derived from a reduction in the number of night accidents.

This is exactly the effect produced in Hartford, Conn., where a moderate program of improving street lighting was initiated a year ago. The lighting was improved on 14 streets or sections of these streets, totaling 10 miles in length, by using more efficient luminaires and double the number of units. The average illumination prior to relighting was 0.18-lumen per square foot, and after relighting 0.43-lumen per square foot. The streets all have asphalt pavement and vary from 25 to 50 feet in width, the majority being 40 feet. The average daily traffic flow varied from 4,000 to 15,000 cars.

On certain sections of these 14 streets having the same type and width of pavement, the same average daily traffic flow, and almost the same length, the lighting was not changed. This fortunate circumstance provided a "control" factor and permitted a three-way check and comparison.

A record was made of every motor-vehicle accident involving injury or death or property damage of $25 or more, for a full year before and after relighting (1) on the relighted streets, (2) on the unchanged section, and (3) in the rest of the city. These were segregated into day and night according to the time of occurrence. Traffic counts on both sections of the 14 streets established the annual traffic volume by day and night, while that for the rest of the city was estimated on the basis of car registration, gasoline consumption and miles per gallon of gasoline.

Data from this study are shown in detail in the tables below, and also in summary in Tables I and II on the next page.

HARTFORD ACCIDENT RECORD JULY 1, 1926, TO JULY 1, 1927

BEFORE RELIGHTING

	Property Damage		Injuries		Fatalities		Pedestrians		Totals		Accidents per M V M		Excess above Normal Night Accident Costs*
Relighted Sections of	D	N	D	N	D	N	D	N	D	N	D	N	
Asylum Ave.	17	21	4	17	0	1	2	6	19	26	8.87	23.32	$2,305
Broad St.	8	10	6	15	0	0	5	8	11	10	11.64	57.14	4,865
Capitol Ave.	16	16	10	10	0	0	4	4	21	20	4.84	13.00	2,180
Charter Oak Ave.	10	7	6	11	0	0	5	4	15	10	12.96	25.91	2,005
Commerce St.	13	5	5	8	0	0	2	1	17	6	14.06	14.08	1,805
Fairfield Ave.	12	8	7	13	0	0	0	0	12	6	9.89	19.16	2,320
Farmington Ave.	32	24	14	24	2	0	7	8	39	31	6.73	16.80	7,110
Hudson St.	19	10	12	10	0	0	1	4	19	14	11.60	25.68	2,160
New Britain Ave.	22	16	13	13	0	2	2	5	24	21	13.88	36.45	2,810
No. Main St.	17	23	11	26	0	0	2	10	10	31	7.84	40.26	8,445
Park St.	11	21	6	16	0	0	1	7	14	26	3.04	11.70	6,070
Walnut St.	4	3	5	2	0	0	4	1	7	4	4.82	6.35	295
Webster St.	2	5	1	6	0	0	0	3	2	8	4.00	40.19	2,135
Wethersfield Ave.	10	17	8	8	0	0	6	6	16	15	3.29	15.00	5,160
Total Relighted Sections	195	186	109	179	2	3	40	67	256	248	6.65	21.50	58,275
Rest of													
Broad St.	55	9	24	13	0	0	11	6	42	15	8.65	9.01	1,105
Capitol Ave.	28	19	16	19	0	0	2	8	22	27	8.97	22.77	5,055
Main St.	80	80	64	75	0	3	34	53	98	101	6.56	21.17	20,066
New Britain Ave.	5	3	12	2	0	1	1	2	7	4	1.84	3.33	180
Park St.	29	30	19	32	0	1	9	11	37	30	9.07	22.12	5,000
Wethersfield Ave.	11	15	5	27	0	0	0	4	13	18	2.72	10.27	7,262
Total These Sections	364	193	140	184	0	4	57	84	222	195	6.68	17.65	39,518
Albany Ave.	46	41	25	47	0	0	11	16	36	57	8.28	20.15	15,280
Rest of City	479	320	329	221	5	7	147	88	518	405	1.73	7.20	48,570
Total	827	541	312	288	5	7	158	108	686	480	1.92	8.00	63,850
Grand Total	988	632	430	691	7	13	250	289	1145	988	4.69	11.98	$150,480

*Fatalities not included.

HARTFORD ACCIDENT RECORD JULY 1, 1927, TO JULY 1, 1928

AFTER RELIGHTING

	Property Damage		Injuries		Fatalities		Pedestrians		Totals		Accidents per M V M		Excess above Normal Night Accident Costs*
Relighted Sections of	D	N	D	N	D	N	D	N	D	N	D	N	
Asylum Ave.	21	15	14	12	0	0	6	1	35	18	7.18	13.65	$1,080
Broad St.	17	9	10	7	1	0	1	2	18	11	10.00	33.02	1,445
Capitol Ave.	15	18	10	5	0	0	2	0	16	18	5.70	11.25	2,055
Charter Oak Ave.	7	6	6	5	0	0	1	5	8	9	6.36	29.22	1,045
Commerce St.	14	7	2	3	0	0	1	0	15	7	13.71	16.34	945
Fairfield Ave.	12	6	5	2	0	0	0	0	12	6	9.16	17.63	735
Farmington Ave.	32	16	16	20	0	0	6	5	38	21	6.79	10.62	4,830
Hudson St.	17	4	12	5	0	0	4	1	16	5	9.27	9.70	180
New Britain Ave.	14	8	8	3	0	0	1	1	15	9	8.78	14.82	495
No. Main St.	8	8	5	5	0	0	1	0	8	5	3.27	6.18	1,540
Park St.	10	1	9	4	0	0	5	4	15	5	2.89	2.88	8
Walnut St.	10	1	0	1	0	0	5	0	15	1	6.51	1.92	755 Credit
Webster St.	1	1	2	2	0	0	2	2	3	5	3.71	17.14	680
Wethersfield Ave.	13	14	7	10	0	0	1	2	14	17	2.88	10.68	1,545
Total Relighted Sections	184	109	111	84	1	0	36	22	317	135	4.86	10.27	18,225
Rest of													
Broad St.	24	20	25	18	1	0	14	2	39	23	7.27	13.17	3,825
Capitol Ave.	19	10	5	6	0	0	1	2	19	12	4.07	9.60	1,475
Main St.	79	70	68	70	0	0	27	24	117	102	8.45	17.20	19,660
New Britain Ave.	17	13	10	11	0	0	2	2	19	15	6.90	11.84	3,086
Park St.	24	23	19	29	0	1	13	8	48	41	10.47	23.86	9,080
Wethersfield Ave.	8	7	3	7	0	0	1	1	7	10	2.23	8.87	2,840
Total These Sections	171	143	110	130	1	1	58	39	249	203	7.08	16.01	39,545
Albany Ave.	32	45	29	27	1	0	12	10	63	82	8.61	24.17	8,080
Rest of City	687	359	411	249	0	7	195	94	617	469	1.41	6.96	46,240
Total	845	387	440	276	1	7	204	104	680	477	3.84	7.57	54,320
Grand Total	1007	644	671	490	3	8	298	177	1145	813	4.54	9.25	$115,270

*Fatalities not included.

TABLE I—SUMMARY OF ONE YEAR'S ACCIDENT RECORD (14 Streets)

Year	Relighted Sections Day	Relighted Sections Night	Unchanged Sections Day	Unchanged Sections Night	Rest of City Day	Rest of City Night	Entire City Day	Entire City Night
1936–7....	232	248	222	195	686	460	1,140	903
1937–8....	217	133	246	203	680	477	1,143	813
Change....	−15	−115	+24	+8	−6	+17	+3	−90
Change %..	−6.6%	−46.3%	+10.8%	+4.1%	−.08%	+3.6%	+.02%	−9.9%

The noteworthy feature of this table lies in the minor changes in the number of accidents as between the two years, with the exception of the marked reduction of 46.3 per cent in the number of night accidents on the relighted sections of the 14 streets. This feature becomes more pronounced when we consider the record on the sections of these same streets where the lighting had not been improved, but where, be it remembered, the type and width of pavement, volume of traffic, were identical in each year, except for lighting in the case of the relighted sections. Instead of a reduction there was an increase of 4.1 per cent in the number of night accidents on these "control" sections. This means that with all conditions identical between the two sections *except lighting*, there was a difference of 50.4 per cent in the number of night accidents.

There was a reduction of 6.6 per cent in the number of day accidents on the relighted streets. This is doubtless due to improved traffic patrol, additional warning and direction signs, and divisional traffic lines, all under the jurisdiction of the Hartford Police Department.

The same effects are evident when volume of traffic is taken into consideration with this accident record.

TABLE II—ACCIDENTS PER MILLION VEHICLE MILES

Year	Relighted Sections Day	Relighted Sections Night	Unchanged Sections Day	Unchanged Sections Night	Rest of City Day	Rest of City Night	Entire City Day	Entire City Night
1936–7....	6.63	21.30	6.88	17.63	3.92	8.00	4.69	11.28
1937–8....	5.88	10.87	7.08	16.01	3.56	7.57	4.34	9.23
Change....	−.75	−10.43	+.20	−.62	−.36	−.43	−.35	−2.05
Change %..	−11.3%	−49%	+2.9%	−3.5%	−9.1%	−5.3%	−7.4%	−18.1%

Here again it will be noted that the principal change occurs on the relighted streets, while there were only minor changes in the other sections of the city. Considering the entire city, there was a reduction of 18 per cent in the night-accident rate; but this was made possible only because of the 49 per cent reduction on the relighted streets.

Where we enter the realm of accident costs we tread on debatable territory because there are direct and indirect, tangible and intangible items to be considered. With respect to direct costs, the Connecticut Motor Vehicle Department requires a report of the property damage in every motor-vehicle accident amounting to $25 or more. The average of these reported damages was used in calculating the property damage costs from motor-vehicle accidents in Hartford. Similarly the casualty insurance companies are well aware of the amount of the average claim paid for personal injuries arising from traffic accidents, and this average was used for the personal-injury item. The cost of fatalities was not included, because these costs vary so widely that no average figure is dependable. Nor was any consideration given to such items as cost of traffic courts, traffic control officers, both fixed and mobile, or traffic signals. These are all necessary because we have traffic accidents. And the community pays the bill for all of them.

Inasmuch as it is generally accepted by engineering authorities that traffic volume divides approximately 75 per cent by day and 25 per cent by night, there should be a similar division of traffic accidents. Because of poorer visibility at night, it is seldom that the accidents actually divide in that ratio, the night proportion usually being much greater. However, in judging the effect of changes in visibility, it is customary to use the day accident record as the standard, and one-third of the day record is the proportion which should be expected at night with visibility approaching day conditions. Then, when the number of accidents actually occurring at night is greater than this "expectancy," the additional accidents over "expectancy" are classed as excess night accidents, and their value can be calculated as such.

Using the average costs for property damage and personal injury as outlined above, we find the cost of excess night accidents on the relighted streets for the year before relighting was $55,275, and for the year after relighting was $18,725.

The annual cost of the old lighting was $17,081 and that of the improved lighting was $25,506.

Thus we see that for only the relighted streets the combined bill for accidents and street lighting before the lighting was changed was $72,356 a year. After relighting, the combined bill for these same streets was $44,231, which shows an annual saving of $28,125. This saving, effected on only 14 streets covering only 10 miles, is more than the entire annual lighting bill on these streets and is 3½ times greater than the added cost of the improved lighting.

On the unchanged sections there was but slight change in the combined bill over the two years, and for each year the cost was substantially higher than for the relighted sections.

The fact that the night accident rate after relighting was still twice as high as the day rate shows that the improved illumination level, which is in the order of one-half lumen per square foot, is not yet adequate from an accident prevention viewpoint on these streets. The experience in Hartford indicates that the illumination might well be increased at least twofold, to the financial and humanitarian benefit of the community.

(*See also page 125, this issue.*)

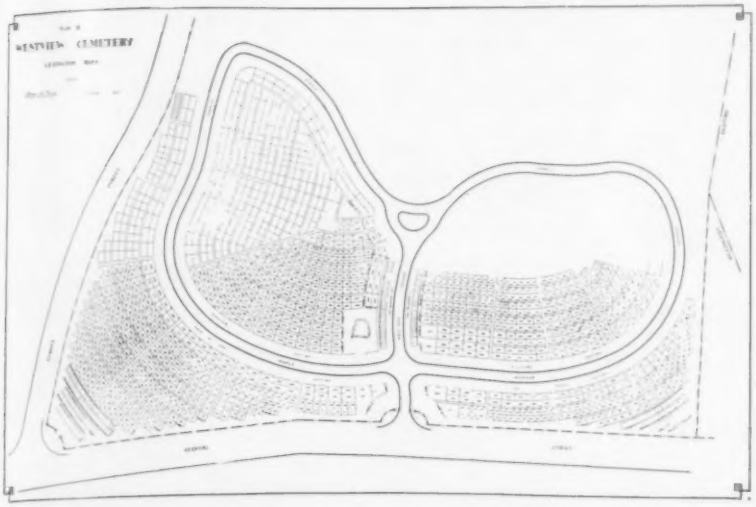
Toronto Spends $3,000,000 for 140 Trolley Cars

A $3,000,000 order for 140 Street Railway Presidents' Conference Committee street cars recently announced by Chairman William C. McBrien of the Toronto Transportation Commission is the biggest lump-sum expenditure for street-railway cars in ten years, says Charles Gordon, Managing Director of the American Transit Association. The steel structures will be built in the shops of the St. Louis Car Co. and exported to the Hamilton, Ont., plant of the Canadian Westinghouse Co., makers of the 510 traction motors. These motors weigh only 14½ pounds per horsepower, compared with 37 pounds prior to the design of the P. C. C. car, achieved by higher speed, better insulation and ventilation, and the use of rolled instead of cast steel for the motor frame. Quiet and smoothness are greatly aided by suspending the bearings in rubber and placing a disk of rubber in the wheel between tread and axle, and a combination of three types of brakes working automatically in sequence makes it possible for the cars to brake at the rate of nearly five miles per hour each second, without passenger discomfort.

The Toronto transportation system includes 245 miles of track. Its passengers pay a 10-cent cash fare or 25 cents for 4 tickets. Street-car traffic radiates in all directions from the business district, which releases 42,000 people at 5 P. M. each work day. Outlying sections are served by buses feeding to street-car routes. Annually, 150,000,000 car riders use the system.

A Cemetery Need Not Be a Nightmare

By EDWARD T. HARTMAN



TWENTY years ago the town of Lexington, Mass., owned a little over forty acres of land for cemetery purposes. The work of development was placed in the hands of the planning board of six members and the cemetery committee of three members.

Some members of the planning board, who were dissatisfied with the unfortunate conditions in many cemeteries filled with incongruous and often inartistic headstones, believed that a cemetery should be a place of restfulness and beauty. A proposal was made to build such a cemetery. Some of the arguments later developed were very interesting.

One member expressed the view that in many instances the erection of headstones resulted in a mere competition in ostentation. It was further brought out that because of this competition, people often mortgaged the future of the living in order to pay respect to the dead. It was believed that respect was due to both, and that on the whole the interests of the living were more vital to the public welfare than respect to the dead. It was felt that a new type of cemetery could be designed more to the interests of the living and far more respectful to the dead.

It therefore was arranged that the cemetery should be designed to look like a park but serve all the purposes of a cemetery. The grave areas were made to resemble open lawns, with vistas, in a park-like area. Certain of the more rugged and rocky spots, of which there were several, were developed in a naturalistic way to break monotony and add to the beauty of the whole. Headstones were forbidden.

The growth has been slow, but the cemetery through its partial development now tells its own story. People who pass it comment upon it, and it is already receiving many visitors. The accompanying plan and photographs tell the story effectively.

It had been argued elsewhere that a cemetery could be developed with a screen of shrubs and trees to shut off views of the interior from houses and travelers in the vicinity. The Lexington committee believed that the right thing to do was to develop nothing which needed to be hidden.

Another argument had been that old cemeteries, two or three generations after the last burial, should have the headstones removed, making the whole into a quiet park, landscaped as such a park should be. It was felt that if this were a sound argument, it would be more sound to so develop it in the beginning, and to so maintain it.

One visiting the developed portion now sees nothing but lawns, flowers, shrubbery, and trees. The grassed lawn-like areas are the grave lots. They are perfectly identifiable from the plan. In recent years lots have been selling quite rapidly. The frontage of the land on the main street is bounded by an artistic iron fence, partly covered with vines, and the whole resembles a quiet, park-like area, developed with great skill as to landscape design. There could be no more respectful place of resting for the dead.

The living citizen much prefers to anticipate burial in such a place of beauty than in an area dominated by incongruity; possibly by toppling incongruity in the midst of weeds and dead cats. The average cemetery is one of the worst bad things we have ever developed. It is time for a new tradition in places for burial. In the meantime cremation is developing another tradition.

OPEN LAWNS IN LEXINGTON'S PARK-LIKE CEMETERY

A New Fire Engine

No Transmission or Auxiliary Cooling System or Running Board—Weight Evenly Distributed—Turns Around in a Smaller Circle

By DANIEL COLLINS
Fire Chief, Elmira, N. Y.

AT THE 65th Annual Conference of the International Association of Fire Chiefs, somebody said: "I believe centrifugal pumps direct-connected to multi-cylinder engines are desirable, and I believe it will simplify the operation of the engines if such types are built."

It was not I who said it, but I ordered the first pumping engine that was built that way, one of the new 500 series of pumpers put out by American-LaFrance and Foamite Industries, Inc. These pumpers have a number of new features, but the most important is putting the pump in the direct line of drive, where no pump transmission is required. A single lever in the driving compartment connects the pump to the motor. This new and simpler method reduces power consumption by eliminating a loss through the pump transmission gears, and thus increases the reserve performance proportionately. The pump has better than 30 per cent reserve in excess of rated capacity, with the engine speed still below the limit established by the National Board.

NEW-STYLE PUMPER PUT IN SERVICE IN ELMIRA IN AUGUST, 1938, BY CHIEF COLLINS, SHOWN HERE

No Running Board

Safety for the firemen answering an alarm or returning to the station is tremendously increased by providing accommodations for five men in the seating compartment with additional men on the cat-walk inside the body on either side. This eliminates all men from the running boards, and, indeed, there is no running board, an obvious element of safety.

Greater stability and shorter turning radius are provided by wider front axles. The width of the apparatus over the front fenders and over the rear fenders is the same, which will tend to prevent traffic accidents that occurred with a narrower front and a wide rear end.

The ladders, a 24-foot extension and a 14-foot roof ladder with hooks, are carried above the hose body, where they are out of the way of the firemen and yet are easily accessible and fully protected from the weather. There have been instances where the pumper was stationed next to a telegraph pole and it was impossible to remove the ladders from the side.

Another feature that increases dependability and reduces maintenance cost is the elimination of an auxiliary cooling system. The new cooling is unique for fire engines in that the whole system is now self-contained and of adequate capacity for cooling under all conditions of operation. A 25-gallon capacity system is provided which is never troubled with leaves and dirt obstructing its efficiency, which sometimes occurs with an auxiliary cooler.

Mounting the pump in the line of drive with the discharge gates ahead of the dash in a central control panel considerably improves efficiency of operation. The operating engineer has all controls in one place, including priming device when drafting, governor control, pressure and hydrant gages, tachometer, and oil gage, together with bleeder cock controls and all discharge gate controls. The suction hose is no longer an obstruction which adds to the hazards of night operation and to inconvenience for day operation. Another important safety feature is the location of the gasoline tank in the chassis frame behind the rear axle. Finally, the new design, providing a different distribution of weight, results in a smoother-riding and better-handled fire engine than it has been my privilege ever to operate before.

It is a grand machine, and our departmental records will prove it!

Milestones on New Haven's Highway to Health

EIGHT HISTORICAL PANELS, MEASURING 40 FEET, WHICH WERE PREPARED AS A WPA PROJECT AND EXHIBITED AT THE NEW HAVEN, CONN., TERCENTENARY EXPOSITION

Reproduced through the courtesy of Dr. Joseph I. Linde, Health Officer

Fire Apparatus Owned by 310 Municipalities of 10,000 Population or More

Columns left to right are:

1. Population in 1,000's
2. Pumpers and combinations
3. Aerial ladders
4. Service ladders
5. Special-duty trucks
6. Maintenance trucks
7. Pumpers over 15 years old
8. Ladders over 15 years old

A—In active service
R—On reserve

	1	2		3		4		5		6		7	8
		A	R	A	R	A	R	A	R	A	R		
Alabama													
Bessemer	21	3	1	..	..	..	..	..	..	..	..	2	..
Birmingham	260	27	2	2	0	2	0	1	0	3	0	7	3
Decatur	16	3	0	0	..	1	..	0	..	0	..	1	..
Florence	12	2	..	1	..	1	..	..	..	..	..	1	..
Huntsville	12	3	1	..	..	..	..	..	..	..	..	1	..
Tuscaloosa	21	4	..	..	..	..	..	..	..	..	..	4	..
Arizona													
Phoenix	48	7	1	1	..	..	..	..	..	..	..	3	1
Tucson	33	5	1	1	..	1	..	..	..	..	..	4	1
Arkansas													
Fort Smith	31	6	3	1	..	1	..	..	..	..	..	2	1
Jonesboro	10	3	..	0	..	4	..	..	..	..	..	0	0
California													
Bakersfield	26	4	1	..	..	1	..	2	..	1	..	2	1
Berkeley	82	5	3	..	..	1	..	1	..	1	..	1	1
Beverly Hills	17	4	1	1	..	..	..	3	..	..	..	1	0
Brawley	10	2	1	..	..	1	..	..	..	..	..	1	..
Burlingame	13	2	0	..	..	1	0	..	..	1	0	1	0
Fresno	53	7	1	1	..	1	..	6	..	2	..	4	1
Fullerton	11	2	..	..	..	..	..	2	..	..	..	1	..
Gardena	15	1	0	..	..	..	..	..	..	..	..	0	..
Glendale	63	7	1	..	..	1	..	..	..	..	..	2	..
Inglewood	19	2	..	..	..	..	..	1	..	..	..	1	..
Long Beach	142	13	..	1	..	..	1	9	..	..	..	3	2
Los Angeles	1,238	150	12	7	..	18	..	3	..	46	2	25	6
Modesto	14	4	..	1	..	..	..	..	..	1	..	1	0
Palo Alto	13	2	0	..	..	1	0	1	0	..	..	1	0
Pasadena	76	13	1	1	1	1	..	1	..	3	..	6	1
Pomona	21	4	0	0	0	1	0	1	0	0	0	2	0
San Bernardino	37	5	0	1	0	..	1	1	0	..	..	0	1
San Diego	148	19	4	1	1	1	0	0	0	3	1	10	2
San Mateo	13	3	..	..	..	1	..	..	..	1	..	1	1
Santa Barbara	34	5	1	1	0	0	0	1	0	1	0	2	1
Santa Cruz	14	3	..	..	..	3	3	..	..	..	..	0	..
Santa Monica	37	4	1	0	..	0	..	0	..	1	..	0	..
South Gate	20	2	0	0	..	..	..	1	..	0	..	2	0
So. San Francisco	6	2	..	..	..	..	..	..	..	..	..	1	0
Vallejo	14	3	..	..	..	..	..	1	..	..	..	1	..
Ventura	12	2	..	..	..	1	..	2	..	..	..	2	..
Whittier	15	2	0	..	..	..	0	..	..	..	0	0	0
Colorado													
Colorado Springs	33	5	3	1	0	0	0	0	0	1	0	3	0
Fort Collins	11	1	1	0	0	1	0	..	0	1	0	1	0
Grand Junction	10	2	0	0	0	0	0	0	..	0	..	2	..
Greeley	12	1	1	0	..	1	..	..	..	..	..	2	..
Pueblo	50	4	..	1	1	1	..	2	..	1	..	2	..
Trinidad	12	2	1	..	..	1	..	..	..	..	..	0	0
Connecticut													
East Hartford	17	4	..	0	..	0	..	..	..	1	..	1	..
Fairfield	17	6	..	..	..	..	1	..	..	..	..	0	..
Meriden	38	4	..	1	..	..	1	1	..	1	..	0	1
New Haven	163	16	0	4	0	2	0	1	..	1	0	12	4
New London	30	6	0	1	0	1	0	1	0	1	0	..	..
Norwich	23	4	0	1	0	0	0	0	0	..	..	3	1
Stratford	19	2	..	..	..	..	..	..	..	..	..	1	..
Waterbury	100	11	2	1	..	2	2	..	..	2	1	9	4
Delaware													
Wilmington	107	10	1	2	..	1	..	1	..	1	..	5	2
Dist. of Columbia													
Washington	487	60	12	14	2	1	2	5	1	11	0	17	5
Florida													
Jacksonville	130	13	3	1	1	3	1	2	..	1	..	3	3
Key West	13	4	..	..	..	..	..	..	..	..	..	2	..
Miami	111	10	1	1	1	2	1	..	..	2	..	5	2
Orlando	27	4	3	1	0	..	1	..	..	..	..	2	1
St. Augustine	12	3	..	..	..	..	..	..	..	..	..	2	..
Tampa	101	9	1	1	..	..	..	1	..	..	..	4	1
Georgia													
Macon	54	6	1	1	..	2	..	..	..	1	..	5	1
Rome	22	5	..	1	..	0	..	..	..	1	..	1	1
Hawaii													
Honolulu	137	18	1	1	..	..	..	1	..	3	..	5	0
Idaho													
Boise	22	3	1	1	..	..	..	..	1	..	..	0	1
Pocatello	16	3	1	1	..	..	..	..	..	..	..	1	2
Illinois													
Aurora	47	4	1	..	1	1	..	..	..	..	..	1	1
Belleville	28	3	2	..	..	1	..	..	..	..	..	2	0
Brookfield	10	2	..	..	..	..	..	..	..	..	..	..	..
Cicero	67	6	1	1	..	1	..	..	..	..	..	..	..
East Peoria	5	1	..	..	..	..	..	..	..	..	..	0	..
Elgin	36	4	1	1	..	..	..	..	..	..	..	..	..
Freeport	22	1	..	1	..	..	..	..	1	..	1	1	1
Joliet	43	5	..	1	..	1	..	1	..	1	..	..	..
Kankakee	21	2	1	1	..	0	..	..	..	..	..	1	..
Lincoln	13	3	..	..	..	1	..	..	..	..	..	..	..
Mattoon	15	2	1	..	..	1	..	..	..	..	..	1	1
Quincy	39	6	1	1	..	2	1	1	..	1	..	6	1
Indiana													
Connersville	13	4	..	..	..	1	..	..	..	1	1	2	0
Elkhart	33	4	1	..	..	1	1	1	..	..	..	2	1
Hammond	65	6	1	1	..	1	..	1	..	..	..	3	0
Kokomo	33	3	1	1	..	1	..	..	..	1	..	3	0
Lafayette	26	5	2	..	..	1	..	..	..	..	..	1	1
Logansport	19	4	2	..	..	1	..	1	..	1	..	0	1
New Albany	26	4	1	..	..	1	..	1	..	1	..	2	0
Newcastle	14	2	1	..	..	1	..	..	..	..	..	0	1
Peru	13	4	2	..	..	1	..	..	..	..	..	0	1
Richmond	32	5	1	1	1	..	..	..	..	1	..	0	1
Shelbyville	11	2	..	..	..	1	..	..	..	..	..	0	1
South Bend	104	11	1	1	..	2	..	1	..	..	..	5	2
Terre Haute	63	9	2	1	..	5	..	1	..	2	..	3	4
Iowa													
Ames	10	1	..	..	..	1	..	..	..	..	..	1	1
Burlington	27	5	2	..	..	1	..	1	..	1	..	1	0
Cedar Rapids	56	8	2	1	..	1	1	..	..	3	..	4	1
Dubuque	42	5	1	1	..	1	..	1	..	..	..	4	1
Fort Dodge	22	4	..	1	..	..	..	..	..	..	..	1	1
Marshalltown	17	4	..	1	..	..	..	..	..	..	..	1	..
Mason City	23	3	1	1	..	..	..	1	..	..	..	0	1
Newton	12	2	..	..	..	4	..	..	..	1	..	1	2
Oskaloosa	10	2	1	..	..	..	..	..	..	..	..	0	0
Sioux City	79	6	1	1	..	2	2	..	..	2	..	4	2
Kansas													
Arkansas City	14	4	..	..	..	1	..	..	..	..	..	1	0
Atchison	13	3	1	1	..	..	..	..	..	..	..	1	1
Chanute	10	4	..	..	..	1	..	..	..	..	..	0	0
Coffeyville	16	2	..	..	..	1	..	1	..	..	..	1	0
Eldorado	10	3	..	..	..	1	..	..	..	0	..	1	0
Kansas City	122	12	1	1	..	3	..	..	..	1	..	1	..
Leavenworth	17	2	..	..	..	1	..	..	..	..	..	0	1
Manhattan	10	3	..	..	..	..	..	..	..	..	..	0	0
Newton	11	2	1	..	..	1	..	..	..	..	..	1	1
Topeka	64	6	2	1	..	1	..	1	..	1	..	1	..
Wichita	111	17	..	1	..	3	..	..	..	3	..	3	2
Kentucky													
Ashland	29	3	..	..	..	1	..	3	..	..	..	2	1
Hopkinsville	11	2	..	..	..	1	..	0	..	..	..	0	1
Lexington	46	7	1	1	..	1	..	2	1	..	1	6	2
Louisville	308	24	7	3	..	..	4	1	..	4	..	8	1
Paducah	34	3	1	..	..	1	..	1	..	..	..	2	0
Louisiana													
Baton Rouge	31	5	2	1	..	1	..	..	..	1	..	2	1
Shreveport	77	10	1	1	..	2	..	..	..	1	..	0	0
Maine													
Auburn	19	6	..	..	..	1	..	..	..	..	..	2	0
Lewiston	35	5	1	1	..	1	..	2	..	1	..	0	0
Portland	71	10	2	3	..	2	1	2	2	2	..	2	0
Sanford	13	2	..	..	..	1	1	2	..	1	..	0	0
South Portland	14	5	..	..	..	2	..	2	..	1	..	0	0
Maryland													
Hagerstown	31	4	1	1	..	2	..	..	..	..	..	2	1
Massachusetts													
Adams	13	2	..	..	..	1	..	..	..	1	..	..	..
Belmont	22	3	1	1	..	..	1	1	..	..	..	1	1
Brockton	64	12	..	2	..	1	1	2	..	2	..	4	1
Brookline	47	7	1	3	..	..	1	2	..	2	..	5	2
Cambridge	114	9	2	4	..	..	1	2	..	2	..	5	2
Chelsea	46	5	..	1	..	1	1	..	..	1	..	0	0
Danvers	13	4	1	..	..	1	..	..	..	1	..	1	0
Everett	48	5	1	1	..	2	..	..	..	..	..	2	1
Fairhaven	11	5	..	..	..	1	..	3	..	1	..	1	0
Fitchburg	41	7	..	1	..	2	..	..	..	2	..	1	..
Framingham	22	5	1	1	..	1	..	2	1	2	..	2	1
Gardner	19	4	..	..	..	2	..	1	..	..	..	1	0
Greenfield	16	3	..	..	..	1	..	..	..	1	..	2	2
Haverhill	49	9	1	1	..	1	..	3	..	..	..	3	2
Holyoke	57	8	1	2	1	1	..	..	..	2	..	5	2
Lowell	100	12	1	1	..	3	..	2	..	2	..	5	2
Lynn	102	13	..	4	1	..	..	..	..	1	..	1	0
Malden	58	6	1	1	..	2	..	2	..	3	..	1	2
Melrose	23	3	..	1	..	..	1	1	..	..	1	1	1
Milton	16	2	..	..	..	1	..	1	1	..	..	1	0
New Bedford	113	11	3	4	..	1	..	1	..	3	..	6	4
Peabody	21	7	..	..	..	1	..	..	..	1	..	2	..

	1	2 A	2 R	3 A	3 R	4 A	4 R	5 A	5 R	6 A	6 R	7	8
Pittsfield	50	4	..	1	..	1	..	1	0	1	..	0	0
Quincy	72	7	1	0	..	5	..	1	..	1	..	0	0
Revere	36	5	1	2	..	..	..	1	..	1	..	2	0
Salem	43	6	1	1	..	1	..	2	..	..	..	1	2
Saugus	15	3	..	..	..	1	..	1	..	..	..	1	..
Somerville	104	13	1	3	..	1	..	1	..	1	..	1	0
Springfield	150	22	..	7	..	1	1	4	..	3	..	4	5
Watertown	35	3	..	..	..	2	..	..	..	1	..	2	2
Wellesley	11	4	..	1	..	1	..	1	..	..	..	1	1
Weymouth	21	4	1	..	..	2	..	1	..	1	..	0	0
Worcester	195	20	..	3	..	7	..	1	..	3	..	5	5
Michigan													
Ann Arbor	27	3	..	1	..	2	..	..	..	1	..	1	1
Bay City	47	4	..	..	..	2	1	..	..	1	..	3	1
Dearborn	50	4	..	..	..	2	..	2	..	1	..	0	0
Grand Rapids	169	12	2	2	..	4	1	..	3	2	..	5	0
Highland Park	53	4	..	2	..	1	1	1	..	1	..	3	2
Kalamazoo	55	7	2	1	..	2	..	1	..	3	..	2	6
Lincoln Park	12	1	..	..	..	..	..	..	..	..	..	0	0
Marquette	14	2	..	..	..	1	..	..	..	..	..	..	..
Muskegon	41	6	0	..	..	1	..	..	..	1	..	4	1
Pontiac	65	5	1	..	..	2	..	..	..	1	..	3	1
Saginaw	80	9	1	1	..	2	1	..	..	2	..	4	3
Sault Ste. Marie	13	3	..	..	..	1	..	..	..	..	..	1	..
Minnesota													
Duluth	101	10	1	1	..	3	..	2	..	1	..	5	2
Faribault	13	1	..	1	..	..	..	..	..	..	..	1	1
Minneapolis	464	25	12	5	1	3	4	4	1	..	..	7	6
Rochester	21	3	..	2	..	..	..	1	..	1	..	1	1
St. Cloud	21	2	1	..	..	1	..	..	..	..	..	..	..
St. Paul	272	21	3	5	..	4	1	3	..	4	..	5	9
Winona	21	3	1	2	..	1	..	0	..	1	..	0	1
Mississippi													
Hattiesburg	19	4	0	0	0	1	0	0	0	..	..	2	..
Jackson	48	6	2	1	0	1	0	..	..	..	..	2	0
Missouri													
Hannibal	23	3	..	..	..	1	..	..	..	..	..	1	0
Joplin	33	3	1	1	..	0	..	1	..	1	..	2	1
Moberly	13	2	..	..	..	..	..	..	..	..	..	0	0
St. Charles	10	2	..	..	..	1	..	..	..	..	..	1	1
St. Joseph	81	10	..	1	..	2	1	2	..	1	..	10	4
University City	26	2	..	..	..	1	..	..	..	..	..	0	0
Montana													
Billings	16	2	1	1	..	..	..	..	..	..	..	2	0
Nebraska													
Grand Island	18	2	..	..	..	1	..	..	..	..	..	0	0
Lincoln	76	9	2	1	..	1	1	1	..	1	..	5	2
New Hampshire													
Nashua	31	8	..	1	..	3	..	2	..	0	..	2	1
New Jersey													
Bloomfield	38	4	1	1	..	1	..	1	..	1	..	1	..
Elizabeth	115	13	1	3	1	..	..	3	..	4	..	4	1
Gloucester	14	3	..	..	..	1	..	..	..	..	..	0	1
Hoboken	56	6	2	3	1	..	..	5	..	1	1	2	1
Linden	21	3	..	..	..	..	..	1	..	1	..	1	0
Passaic	63	6	..	2	..	..	..	..	..	1	..	0	0
Pleasantville	12	2	..	..	..	1	..	1	..	..	..	1	..
Teaneck	17	3	..	1	..	1	..	2	..	1	..	1	0
Trenton	123	10	2	3	..	1	..	4	..	..	..	3	3
Union City	59	7	1	3	1	..	..	3	..	2	..	5	1
West Orange	24	3	1	..	..	1	1	..	..	1	..	1	1
New York													
Auburn	37	5	1	1	..	1	..	..	..	1	..	1	1
Binghamton	77	9	2	2	..	1	..	1	..	1	..	3	2
Buffalo	573	35	5	14	2	..	..	7	..	14	..	21	2
Elmira	47	5	..	1	1	1	..	2	..	1	..	2	1
Elmira Heights	5	2	..	..	..	..	..	..	..	..	..	1	0
Herkimer	10	2	1	..	..	1	..	..	..	..	..	3	1
Johnson City	14	3	..	1	..	..	..	1	..	..	..	0	0
Kingston	28	8	..	1	..	1	..	1	..	..	..	1	1
Lackawanna	24	2	0	1	0	1	0	0	..	1	..	1	1
Mamaroneck	12	2	..	..	..	1	..	2	..	..	..	1	..
Newburgh	31	5	..	1	1	0	..	..	..	..	..	4	..
New Rochelle	54	6	1	3	1	..	..	..	1	2	..	5	1
Niagara Falls	75	8	3	3	..	1	..	..	..	1	..	3	1
No. Tonawanda	19	4	..	..	..	1	..	3	1	1	..	1	..
Plattsburg	13	2	..	..	..	1	..	1	..	..	..	0	1
Port Jervis	10	6	..	..	..	1	..	..	..	..	..	1	..
Poughkeepsie	40	7	1	2	..	..	..	1	..	1	..	3	1
Rome	32	4	1	..	..	1	..	1	..	..	..	1	1
Utica	102	11	1	2	..	3	1	3	..	1	..	8	3
North Carolina													
Asheville	50	6	..	1	..	1	..	..	..	..	..	4	1
Fayetteville	13	3	..	1	..	6	..	..	..	..	..	1	..
High Point	37	6	..	1	..	1	..	..	..	1	..	2	1
Raleigh	37	5	..	1	..	1	..	..	..	..	..	0	2
Salisbury	17	2	..	..	..	1	..	1	..	..	..	1	0
Wilmington	32	6	1	1	..	..	..	..	..	1	..	2	1
North Dakota													
Bismarck	11	2	..	..	..	..	..	..	..	..	..	0	0
Fargo	29	2	2	1	..	1	..	1	..	..	..	1	1
Ohio													
Alliance	23	3	1	1	..	..	..	1	..	1	..	1	1
Bucyrus	10	3	1	..	..	1	..	..	..	..	..	1	0
Cleveland Heights	51	3	..	1	..	1	..	1	..	..	..	0	1
Columbus	291	19	4	4	..	4	..	1	..	4	..	14	2
Coshocton	10	2	..	..	..	..	..	..	..	..	..	1	..
Cuyahoga Falls	20	1	..	..	..	1	..	1	..	..	..	1	..
Dayton	201	12	2	2	1	4	1	1	..	5	..	5	0
East Cleveland	37	3	..	..	..	..	..	..	..	..	..	1	0
East Palestine	5	2	..	..	..	..	..	..	..	..	..	1	0
Findlay	19	3	..	..	..	1	..	0	..	..	..	2	1
Hamilton	52	6	2	1	1	..	..	1	..	..	..	0	1
Lakewood	71	4	..	1	..	1	..	..	..	2	..	2	0
Lima	42	6	1	1	..	..	..	..	..	1	..	4	0
Marietta	14	2	..	1	..	..	..	..	..	..	..	0	1
Marion	31	3	1	1	..	..	..	..	..	..	..	4	1
Middletown	30	3	..	1	..	..	..	..	..	..	..	1	0
Warren	41	3	1	1	..	1	..	1	..	..	..	1	2
Zanesville	36	5	..	1	..	1	..	..	..	1	..	4	1
Oklahoma													
Lawton	12	2	..	1	..	..	..	..	..	..	..	1	..
Muskogee	32	6	1	1	..	1	..	..	..	..	..	5	2
Okmulgee	17	3	1	..	1	..	..	..	..	..	..	3	1
Oregon													
Astoria	10	4	..	..	1	..	..	..	..	..	..	4	1
Portland	302	24	1	4	1	3	0	4	..	3	..	14	3
Salem	26	6	1	1	..	..	..	1	..	..	..	2	..
Pennsylvania													
Aliquippa	27	4	..	..	..	2	..	..	..	1	..	0	0
Allentown	93	12	1	2	..	..	..	1	..	1	..	7	1
Altoona	82	8	..	1	..	2	..	..	..	1	..	1	2
Ambridge	20	2	..	..	..	1	..	..	..	..	..	1	1
Bradford	19	3	1	1	..	..	..	..	..	1	..	1	0
Canonsburg	13	2	..	..	..	..	..	1	..	..	..	0	0
Dickson City	12	2	..	1	..	1	..	..	..	..	..	1	0
Easton	34	4	1	..	..	1	..	1	..	..	1	3	1
Erie	116	9	1	1	..	2	..	..	..	2	1	9	2
Harrisburg	80	8	..	3	..	..	..	1	..	1	..	4	1
Lebanon	26	6	..	1	..	..	..	..	..	..	..	1	1
Lewistown	13	3	..	1	..	..	..	..	..	2	..	1	..
Oil City	22	3	..	..	..	1	..	..	..	..	..	0	1
New Castle	49	7	1	1	..	1	..	..	..	..	..	2	1
New Kensington	17	5	1	..	..	1	..	3	..	1	..	0	0
Pittsburgh	670	48	1	10	1	12	..	1	1	..	..	24	14
Reading	111	24	..	3	..	..	..	..	..	1	..	8	2
Swissvale	16	1	..	..	..	..	..	1	..	..	..	..	..
Washington	24	3	..	..	..	..	..	..	..	..	..	..	..
Waynesboro	10	1	1	..	..	1	..	..	..	..	..	0	1
West Chester	12	4	1	..	..	1	..	..	..	..	..	2	1
Rhode Island													
Newport	28	8	..	1	..	2	..	1	..	1	..	3	2
Pawtucket	77	6	2	1	..	2	..	..	..	1	..	1	1
Woonsocket	49	6	1	3	..	..	1	1	..	1	..	1	1
South Carolina													
Spartanburg	28	4	2	1	..	..	..	..	..	1	..	1	0
South Dakota													
Aberdeen	16	3	1	1	..	0	..	2	..	..	..	1	..
Huron	11	3	..	1	..	2	..	6	..	..	..	0	0
Tennessee													
Jackson	22	3	..	..	..	1	..	..	..	..	..	..	..
Texas													
Beaumont	58	9	2	1	..	1	..	1	..	3	..	2	1
Corsicana	15	3	..	..	..	1	..	3	..	1	..	1	..
Dallas	260	22	5	2	2	6	1	6	..	3	..	12	6
Del Rio	12	2	..	..	..	4	..	..	..	..	..	1	..
El Paso	102	10	2	2	..	1	..	2	..	..	..	3	1
Houston	292	25	2	2	..	6	..	8	..	3	1	12	2
Lubbock	21	4	..	..	..	1	..	2	..	..	..	2	..
Pampa	10	2	..	..	..	..	..	..	..	..	..	0	..
San Antonio	232	18	8	1	1	2	1	0	0	4	0	7	2
Utah													
Salt Lake City	140	10	2	1	..	1	..	1	..	1	..	5	1
Vermont													
Rutland	17	3	..	1	..	..	..	..	..	1	..	1	0
Virginia													
Norfolk	130	12	2	7	0	0	0	1	0	2	0	10	5
Washington													
Olympia	11	3	..	..	..	1	..	..	..	..	..	..	1
Tacoma	107	12	1	2	..	1	..	0	..	1	1	9	3
Vancouver	16	3	..	..	..	..	..	1	..	..	..	1	0
Yakima	22	3	1	1	..	..	..	..	..	..	..	2	1
West Virginia													
Bluefield	19	2	..	1	..	..	..	..	..	..	..	1	0
Charleston	60	7	3	1	1	1	..	1	..	1	..	2	1
Huntington	76	9	1	1	..	1	..	..	..	2	..	3	1
Martinsburg	15	5	1	1	..	..	..	..	..	..	..	1	..
South Charleston	6	1	1	..	..	..	..	..	..	..	..	1	0
Wheeling	62	9	..	1	..	3	..	1	..	1	..	7	2
Wisconsin													
Ashland	11	2	..	..	..	1	..	..	..	..	..	1	1
Beloit	24	2	1	..	..	..	..	..	..	1	..	1	0
Eau Claire	26	2	1	..	..	1	..	..	..	..	..	2	0
Fond du Lac	26	3	1	..	..	..	1	..	..	..	..	1	1
Jamesville	22	2	1	1	..	0	..	1	..	..	..	2	1
La Crosse	40	5	2	1	..	3	1	..	..	..	..	0	2
Manitowoc	23	3	..	..	..	1	..	1	..	1	..	1	1
Milwaukee	578	34	7	3	1	12	3	8	2	3	2	19	11
Racine	67	6	..	1	..	2	1	1	..	1	..	3	1
Stevens Point	14	2	..	..	..	1	..	..	..	1	..	1	0
Two Rivers	10	2	..	..	..	..	..	..	..	..	..	1	..
West Allis	35	3	..	..	..	1	..	..	..	..	..	1	1

The figures in the foregoing tabulation were reported to THE AMERICAN CITY by the fire chiefs, whose active and reserve equipment totals as follows:

	Active	— Reserve — Total	Ratio
Pumpers and combinations	2,005	272	1:7
Aerial ladders	302	29	1:10
Service ladders	350	54	1:8
Special duty apparatus	253	15	1:17
Maintenance trucks	287	13	1:22

A summary of the fire department situation in these 310 municipalities is given on pages 528-9 of THE MUNICIPAL INDEX 1938.

Cameras Are Municipal Tools in Beaumont

By FRANK L. BERTSCHLER
Superintendent, Department of Parks, Recreation and Aviation,
Beaumont, Texas

AFTER a visit with Mayor LaGuardia of New York, former Mayor P. D. Renfro, of Beaumont, last winter recommended the purchase of a 4 x 5-inch Speed Graphic camera equipped with speed gun, for use of our Department of Parks, Recreation and Aviation.

Photographic work has been carried on more extensively during the past six months than ever before in the history of the city. Not only have departmental photographs been taken consistently, showing work projects, improvements, activities, but a number of new uses for photographs have been developed, as follows:

Accident pictures for Safety Bureau
Proposed street openings
Soot-nuisance reports
Traffic hazards, such as shrubs in park strips
Pictures of activities and unusual occurrences in other departments: city market scenes; sewer cave-ins; new equipment; WPA work projects
Photographs to accompany WPA applications involving demolition of structures
Publicity pictures: City Council change with outgoing mayor turning over key of city to incoming mayor; vaccination of dogs; Negro recreational activities; employees' picnic; used by local and other newspapers and magazines

The cooperation of C. L. Bradley, Superintendent of the Police Department Identification Bureau, and a competent photographer, has permitted all developing, printing and enlarging to be done in the Police Department darkroom.

Negatives are filed for future reference and use in reports, displays and informative exhibits, all in addition to the regular police photographic work.

This Department has eight cameras, some of which are available for the work mentioned above. The nine pieces of equipment permit almost any kind of photograph to be made that may be desired for any division of the municipal government.

Police cameras include:

2 Folmer Graflex, 2¼ x 3¼-inch fingerprint cameras
1 8 x 10-inch laboratory camera equipped with 5 x 7-inch reducing back and wing kits
1 5 x 7-inch View camera
1 3 x 5¼-inch mugging camera with sliding front
1 4 x 5-inch Graflex with speed gun
1 vest pocket Kodak
1 4 x 5-inch Premo No. 9 double extension camera

Cooperation between departments permits photographic work to be done at all hours, economically, and quickly when desired. Slide lectures on various municipal subjects are now proposed. Safety promotion is already being featured in this manner. Reports to city officials may be made more interesting, and Mayor R. A. Coale and City Manager G. H. Petkovsek often call for special photographs in connection with municipal problems.

Snappy Tax Work at Mamaroneck Village

By FREDERICK H. BULL, Jr.
Treasurer-Clerk, Village of Mamaroneck, N. Y.

SINCE 1935 we have prepared our tax roll and bills by addressing and bookkeeping machines, with incalculable saving over the hand method which had been weighing on our civic conscience for some time. In addition to speed, the present system has the advantage of accuracy and neatness and permits us to send notices of delinquents and perform other services not feasible before.

The Elliott addressor is equipped with a selector which can group the stencils by out-of-town taxpayers, and delinquents, and tax-sale lists. In addition to the file of 2 x 4½-inch stencils, we maintain alphabetically by owner's name a file of 3 x 5-inch cards containing the complete stencil information. There are two stencils; name and address on a manila-colored stencil; and name only on a green stencil.

The major tax-collecting job consists of the preparation of the assessor's fieldbook, the tax roll, and the bills. The addressing machine prints on the fieldbook sheets the owner's name, the section and block and lot numbers of the property, but by means of a line cover plate omits the address. The sheets are then bound and the book used in the field by the Village Assessor for recording appraisals. The assessment and tax roll are prepared in like manner, only the first line of information being printed. These sheets are then run through a Burroughs bookkeeping and tax-billing machine which prints the valuations, extends the tax, totals each sheet and also makes out the bill, all in one operation.

Simple Tax Billing

The tax-bill form is in three parts connected by perforation. The top part is a notice that the first of the two installments is due. The middle part is the office copy of the bill kept for receipting. The bottom part is the taxpayer's receipt. The bill is f[illegible]ded with carbon so that the three parts are printed simul[illegible]aneously, the office copy on the reverse face.

When the second installment of the tax is due, the Village Treasurer mails a postcard notice addressed by the stencil.

Recreation in a Changing World

By JAMES EDWARD ROGERS
Director, National Physical Education Service,
National Recreation Association

EIGHT fundamental community basic interests make up the whole community. They are (1) the civic interest, (2) the industrial interest, (3) the labor interest, (4) the religious interest, (5) the educational interest, (6) the health interest, (7) the social service interests, (8) the recreation interest.

Those two searching inventories of American life, namely, the Study of Social Trends and the White House Conference on Child Health and Protection, give us reasons for the rapid development of the playground and recreation movement. Some of the outstanding causes have been:

1. The growth of cities and the urbanization of our civilization.
2. Industrialism.
3. The automatic machine, which has deprived man of physical fatigue, creation, skill satisfaction, and fulfillment while on the job. Man must now find creation, skill satisfaction and sense of achievement off the job in his free time.
4. Specialization in labor.
5. Growth of leisure. There are 168 hours in the week. Our grandfathers worked 72. Today their sons will work only 40 hours.

Education for leisure today becomes as important as education for labor was yesterday. Avocational education is as necessary as vocational education. Every boy and girl in our public schools will have to be trained not only to earn a livelihood but to live a life. Boys and girls must be equipped with desires, skills and appreciations in the art of living. The automatic machine will do the work of the world. Man will become a machine attendant, a robot, pushing levers, pressing buttons and carrying oil cans. We learn to live by living, and so the preparation and training of education becomes imperative.

The world is changing rapidly and fundamentally, and all institutions are making adjustments, taking inventory, and adapting themselves to the challenges of the new day.

Some of the changes that have taken place relative to recreation during the past thirty-five years are as follows:

1. A broader conception of the meaning and significance of recreation. It is more than games, sports and athletics. It is more than just physical recreation. It includes music, art, handcraft, nature study, drama and all forms of human pastimes, hobbies and avocations. Reading is a valuable form of recreation. Because of increased need for adult recreation, this larger understanding of the program of recreation is essential if we are to cope adequately with the new problems.

2. Recreation is not only for children. In the early days we talked largely about play for children and about playgrounds. Now we talk about recreation programs for everyone—young and old, rich and poor, white and colored, native and foreign. A modern sufficient community recreation program should include activities for all the groups: little tots; the pre-school child; the teen age; youth; adolescents; young men and women; adults; old age.

TRAVELING MARIONETTE THEATER, KENEY PARK, HARTFORD, CONN.

3. Modern recreation programs are devoted not only to the summer time when schools are closed. If we are to meet the many challenges presented by the new leisure, year-round systems of recreation are inevitable.

4. Modern recreation programs include indoor as well as outdoor activities. Parks, playgrounds, athletic fields, swimming beaches, golf courses, are important, but with the development of adult recreation indoor programs will become equally important. Hundreds of communities have community houses which are used for social recreation purposes. Many schools are opening their schoolhouses as neighborhood community recreation centers. Parks and playgrounds are building shelters and clubhouses for indoor facilities. These are necessary if we are to carry on programs of dramatics, arts and crafts and music.

5. There are eight fundamental fields of human activity in which individuals, both young and old, will seek to find their avocations. They represent the hungers or desires of human nature. This eight-fold classification of avocational programs, with some suggested activities, is as follows:

(a) Environmental: Excursions, study of birds, flowers, butterflies, all things in nature; camping, hiking.

(b) Physical: Games, sports, apparatus work.

(c) Manual, creative, constructive: Hand work, manual training, domestic science and art; gardening, sand play, clay, etc.; community movement for beautification of community.

(d) Rhythmic: Dance, all vocal and instrumental activities, singing games, rhythmic exercises, community singing, community chorus, children's chorus, glee clubs, quartets; bands, orchestras, harmonica clubs, banjo, mandolin and guitar clubs.

(e) Dramatic: Story dramatization, amateur programs, puppet shows, small plays, impromptu or simple pageants, circus.

(f) Linguistic: Debating, story-telling, participation in citizens meetings, discussion of books.

(g) Social: Organized groups, teams, parties, picnics, dances, meetings, celebrations.

(h) Civic: Attempts to better conditions, citizen

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CITIZEN GOOD WILL?

In every municipality, copying names and data from original records is necessary and important work. When done by sight and hand motions—one character at a time—there are constant opportunities for loss of time, money and citizen good will through errors, delays and illegibility.

The practical protection against these loss hazards is the Addressograph method—used by hundreds of municipalities:

1 Original records are low-cost metal typing units which serve as authentic reference file and transcribing medium combined.

2 Accuracy is predetermined and constantly maintained regardless of who does the work.

3 Legibility is assured because impressions, made through a ribbon, equal best typewriting. Excellent carbon copies are automatically produced.

4 Time is saved because entire record, or any part, is copied with one motion instead of many.

5 Routine is simplified. Peak loads and the hazards of temporary employees are eliminated.

6 Any employee, without specialized training, quickly learns to use the Addressograph method.

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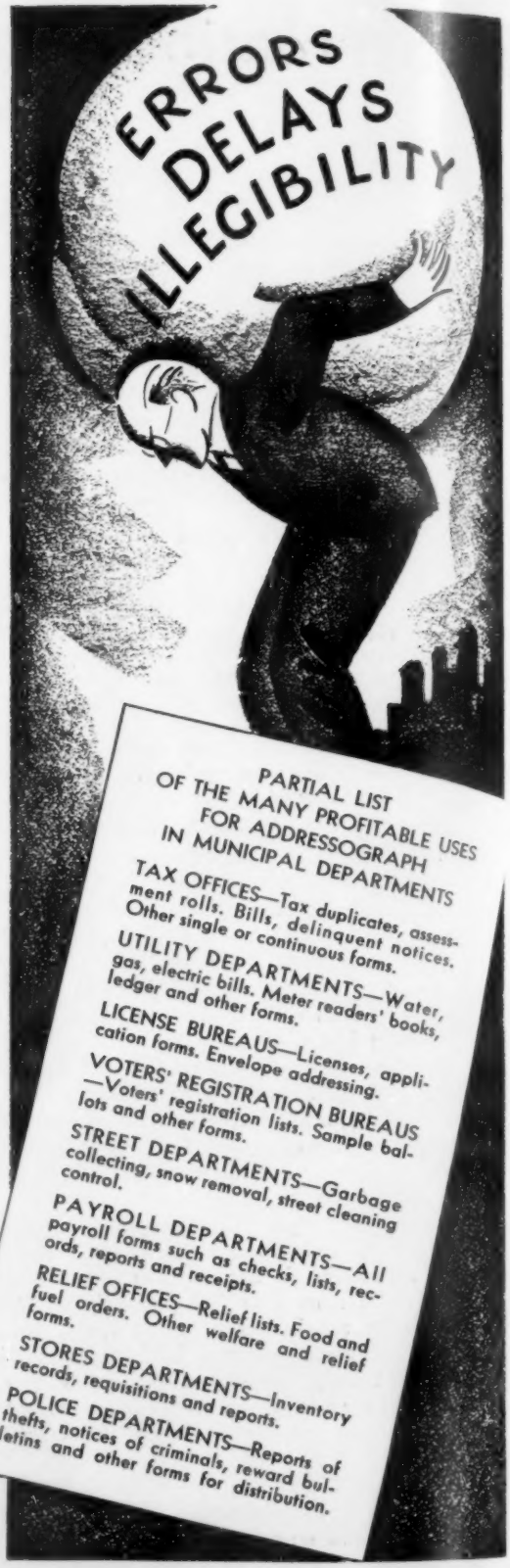
Find out why Addressograph, in use for more than 40 years, is so widely endorsed by municipal officers everywhere. Undoubtedly, several jobs such as those listed at the right, also exist in your municipality. For helpful advice concerning any of your name- and data-writing problems, consult principal city telephone books for address of nearest Addressograph Sales Agency or write direct to—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LICENSE BUREAUS—Licenses, application forms. Envelope addressing.
VOTERS' REGISTRATION BUREAUS—Voters' registration lists. Sample ballots and other forms.
STREET DEPARTMENTS—Garbage collecting, snow removal, street cleaning control.
PAYROLL DEPARTMENTS—All payroll forms such as checks, lists, records, reports and receipts.
RELIEF OFFICES—Relief lists. Food and fuel orders. Other welfare and relief forms.
STORES DEPARTMENTS—Inventory records, requisitions and reports.
POLICE DEPARTMENTS—Reports of thefts, notices of criminals, reward bulletins and other forms for distribution.

ADDRESSOGRAPH-MULTIGRAPH CORPORATION, *Cleveland, Ohio*

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meetings, self-government, clubs for beautification of grounds or neighborhood, patriotic services, investigations of neighborhood conditions, playground conditions, health association.

Unfortunately, in most places recreation is limited to the physical education activities,—a very important part, particularly in the years up to 21,—but if we are to meet the needs of a changing world we must provide balanced programs.

6. We must not think of playgrounds as the only recreation centers, but of all recreational facilities, both indoor and outdoor. The places where recreation is provided in the community are many—playgrounds, parks, schools, churches, libraries, museums, art galleries, fraternal orders, social and civic clubs. The job of a community recreation executive is to mobilize all places possible as recreation centers for young and old.

7. From the point of view of organization and administration, community recreation is composed of three groups:

(a) The public programs; namely, what the cities, parks, schools, libraries, museums, art galleries, are doing.

(b) The semi-public programs; namely, what the Y.M.'s and Y.W.'s, Boy Scouts and similar organizations are doing.

(c) The private programs; namely, what the churches, homes, fraternal, private social, athletic and recreation groups are doing.

8. Recreation has become a distinct profession demanding a definite specific training. It has much in common with general education, physical education and social service, includes training in the arts, crafts, music, drama, etc. Recognizing the demand for specifically trained community recreation executives, the National Recreation Association has established in New York a national graduate training school.

9. One of the best ways to prepare for the new day and the new America is to train our children in attitudes, skills and appreciations that they will carry over into adult life. Here are a few things that we can do to make for an enriched life in order to meet the stresses of both depression and prosperity:

Every child should be given opportunity to develop interests and hobbies that he will keep as long as he likes, so that there will be no dull stretches along the way.

Every child should acquire the habit and—what is more important—the pleasure of reading good books.

Every child should know the joys of outdoor living—fresh air, sunlight through camping, hiking, and nature study trips.

Every child should be exposed to rhythm in all its forms—dance, poetry, music, etc.

Every child should develop early the love of beauty—line, form, color and sound.

Every child should have a chance to work in those activities that best develop his skills and give him the most satisfaction.

Every child should know the joys of social comradeship and cherish the value of loyal friendship.

Every child should live the rules of good sportsmanship.

Every child should be given the opportunity to develop a healthy personality and know the joys of physical well-being and achievement.

Every child should be taught early the habits of rest, repose, reflection and contemplation.

Photo by Oakland Tribune Staff

DAVIE TENNIS STADIUM, OAKLAND, CALIF.

Conversion of an old quarry, given by former Mayor John L. Davie, into a tennis center, by a WPA project

In Conclusion

We have seen during the past fifty years of the history of recreation the following changes to meet the demands of a changing world:

1. From just a children's program to a program to include everybody.

2. From just a summer program to a year-round program.

3. From a program largely adapted to physical recreation to a balanced program including eight fundamental interests.

4. From a privately supported program to a publicly supported program through taxation.

5. The growth and enlargement of the conception of recreation from just physical play to meeting human needs for pastimes, hobbies and recreational interests.

6. From the conception of the recreation program from the community point of view to include city, parks, schools, semi-public and private groups.

7. The growth of the idea that recreation is a community responsibility, a municipal function of government, and a public utility just as important as streets or sewers.

8. The need for an adequate budget set aside definitely for recreation that cannot be touched for other purposes.

9. The need in a community for some group, committee, board or commission, both public and private, whose aim and primary interest is to function a well-balanced year-round recreation program.

10. The definite realization that recreation is a profession demanding expert trained leadership through specific definite preparation.

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International Trucks are available in sizes up to six-wheel units, making them especially adapted to meet a wide range of requirements. International Tractors include five different models of TracTracTors (crawlers) and five models of wheel-type tractors. Plan your snow-removal strategy around International equipment for real effectiveness. Put International Power to work with the help of the nearby International dealer or Company-owned branch.

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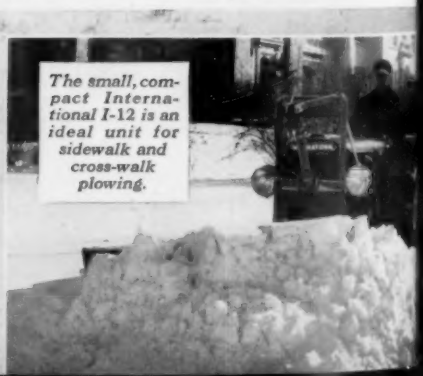

The small, compact International I-12 is an ideal unit for sidewalk and cross-walk plowing.

INTERNATIONAL HARVESTER

Brick Paving in the United States

A Report Presented at the International Road Congress at The Hague, 1938

THE brick pavement structure as constructed in the United States consists essentially of the three following component parts. The surface course is composed of rectangular vitrified clay units assembled in regular pattern with the joints or interstices completely filled and sealed binding the units together. The bed or cushion course is a thin layer of granular material on which the paving brick units are laid and embedded and which will permit slight adjustments necessitated by irregularities in the foundation or by permissible variations in the depths of the brick. The base course or foundation supports the bed and surface and distributes traffic loads to the subgrade.

The Manufacture of Paving Brick

Paving brick are formed by what is known as the "stiff-mud" process of clay products manufacture. The shale or clay after being ground very fine is thoroughly mixed with water to the proper consistency. A powerful auger then forces the stiff mixture through a die onto a moving belt in the form of a column. This column is carried to the cutter, where taut wires automatically cut it into brick units. In so-called vertical fiber paving brick the width and length are determined by the dimensions of the die, and the depth by the spacing of the wires on the cutter. In the wire-cut-lug type the depth is the shorter dimension of the die, and the lugs are formed by an eccentric motion given to the cutting wires. In this type the smooth or die side of the brick is in the surface of the pavement. When the brick are re-pressed before burning, the surface is also smooth.

Formerly the re-pressed and the wire-cut-lug types were in general use, and their preference was in a large degree based on their having side lugs considered essential for the proper filling and sealing of the joints. However, the manufacture of brick having a wire-cut wearing surface with lugs on the side and ends is now commercially practical, and this type, known as vertical fiber lug, is now the most popular single variety in use in the United States. Regardless of the type of vitrified paving unit that may result from future developments, it will undoubtedly have a roughened or deformed wearing surface of non-skid character.

Most paving brick plants are equipped with machinery for evacuating the air from the mixed clay or shale during the process of manufacture. De-airing with proper methods will produce a brick of greater strength and density and improved regularity of shape. Glassy structure causing brittleness must be guarded against, and accurate control in manufacture is necessary in order to obtain the full advantages of the process. The Research Bureau of the National Paving Brick Association at the Ohio State University Experimental Station at Columbus, Ohio, has made observations on the internal structure of paving bricks manufactured with various degrees of vacuum and methods of forming with a view to the further perfecting of plant practices. In some cases authorities have specified that the paving brick be de-aired, although usually the physical requirements govern with no mention of the method of manufacture. In the brick to be used for paving the first tube of the new Lincoln Tunnel under the Hudson River in New York City, a maximum of 18 per cent rattler loss for 3 x 4 x 8½-inch de-aired brick is the requirement.

Standard Types and Sizes

Since 1921 the Division of Simplified Practice of the United States Bureau of Standards, through a committee composed of representatives of engineering and technical societies, has annually recommended a standard list of sizes and varieties of paving brick. The current recognized list is given in Table 1.

TABLE 1.—STANDARD LIST OF SIZES AND VARIETIES OF PAVING BRICK

Variety	Size: Depth Inches	Size: Width Inches	Size: Length Inches	1936 Shipments Per Cent
Re-pressed lug	4	3½	8½	7.1
Vertical fiber lug	2½	4	8½	12.8
Do	3	4	8½	51.3
Do	3½	4	8½	9.3
Total	...	...	...	80.5

It will be noted that the list does not contain lugless varieties which at one time were in general use in the western part of the United States. The proportion of vertical fiber lug brick shipped in 1936 (73.4 per cent) is the greatest for any type since standardization was initiated.

Specifications

Practically all standard specifications for the physical qualities of paving brick used in the United States are identical with or in essential details are based on those of the American Society for Testing Materials.* The requirements in regard to the abrasive loss in the rattler test are sometimes varied (usually downward from the A. S. T. M. requirements) to apply to the quality of brick available in a particular locality. The standard specification for paving brick of the A. S. T. M. was revised in 1937. The most notable innovation in the new specification is the additional requirement to the rattler test limiting the number of broken pieces weighing 1 pound or more.

Some specifications, notably those of the Highway Department of the state of Ohio, which is a large user of paving brick, had in recent years added a test for flexural strength. An investigation indicated that there was close coordination between broken brick in the rattler and low flexural strength. It is believed that a broken brick limita-

* American Society of Testing Materials Designation C7—37 T.

EDITORIAL NOTE.—The reporters for the United States were John Jaster, Jr., Director, Ohio State Highway Department, Principal Reporter; George F. Schlesinger, Engineer Director, National Paving Brick Association; John S. Crandell, Professor of Highway Engineering, University of Illinois; and Roy L. Phillips, City Engineer, Meadville, Pa. The information was submitted by these reporters and organized into one report by the Principal Reporter. Information on manufacture, specifications, methods of construction, fillers and base courses was furnished by Mr. Schlesinger. The section on bed courses was written by Professor Crandall, and Mr. Phillips submitted the information on municipal use.

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tion will be more determinate than the flexural test, in that it will detect brick that have minute cracks on only one surface. In addition, it is considered a criterion of toughness. This is the first time that the rattler test, which was devised in the United States, has been modified, although it is realized that its application by stages is a part of paving brick testing in Holland.

Methods of Construction

While the type and quality of the paving brick unit is a matter of fundamental importance, its method of utilization is at least of equal moment. Brick in the pavement are surrounded and supported by a number of other materials of construction. The excellence of the pavement structure as a whole is the objective of design and construction requirements. Most of the researches and developments concern improvements in what may be termed "auxiliary materials" and the manner in which they are used.

For many years the sand cushion has been used throughout the world as the standard type of bed course on which to lay paving brick. In 1920 a new type was tried at Syracuse, N. Y. It consisted of a mixture of light refined tar and clean, sharp sand in the proportion of 7 per cent coal tar and 93 per cent sand by weight. These materials were mixed together and laid cold. The pavement has been examined from time to time since then and it is in excellent condition today, showing no signs of movement of the cushion.

Since that time this bituminous-bound type of cushion or mastic bed has found favor in many parts of the United States, and is now the standard in several states and cities. The specifications for mastic bed of the American Public Works Association (formerly the American Society of Municipal Engineers*) are typical of those in most general use. In most cases a liquid asphalt has been substituted for coal tar, since the asphaltic product is cheaper. If the correct proportion of asphalt is used, the results seem to be as good as those that are obtained with coal tar, but too often the contractor has been allowed to reduce the amount of asphalt to as low as 3½ per cent, because he has claimed that it is difficult to work with a mixture as "fat" as was originally called for. This is sheer nonsense, and the cushions laid with the leaner mixes soon show signs of deterioration and eventual failure.

Water-gas tar has been used as a binder to some extent, but the results have not been generally satisfactory, as evidenced by the Chestnut Street pavement, Philadelphia, Pa. Some of the cut-back coal tar products have not given good results either, and their use is not recommended. Asphaltic emulsions are not satisfactory. Best results have been obtained with light refined straight-run coal tars, as well as those asphaltic cut-backs which do not cure too rapidly.

The sand used for bituminous cushions is important. It should be clean and sharp. A rounded sand, such as is often to be found in river bottoms, or along swift running streams, is in general unsatisfactory, because the resulting cushion is not stable. It tends to be rolled up into the joints when the power-roller passes over the brick. A sharp sand resists this tendency, and the cushion made with it stays where it is deposited.

More recently experiment has been made with rock asphalt as a cushion course. A lean rock asphalt has been tried, containing about 3 per cent of asphalt. It seems to have some points of superiority, such as ease of handling, and a tendency to set up and resist movement under the wearing surface. It is too early, however, to present a full report on this as the sections observed in this country have been in use less than two years.

In the early practice the bedding course or cushion varied in thickness to accommodate irregularities in the roughly finished base. This frequently resulted in shifting of the cushion, with consequent effect on the brick surface. Present design calls for a much thinner bed with a uniform thickness not greater than ¾-inch, which is possible because of a correspondingly smooth base-course surface requirement.

Fillers

The surface-removal method of bituminous filler application introduced several years ago has now become practically universal practice in the United States. Immediately prior to the application of the filler, the brick are treated with a separating agent of lime and water, or calcium chloride, laundry starch, and water. These agents are sprayed on the surface of the brick in place in the pavement in such way as to coat the exposed surface of the brick without penetrating the joints. When the separating coating has been thus applied, the filler is poured directly into the brick joints, and the surplus scraped off the top so as to leave the surface of the pavement clean and the joints full.

Investigations reported to the Highway Research Board† in 1933 and 1934 indicated that the coefficient of friction, both rolling and sliding, on "a vertical fiber brick road, free of asphalt filler" was relatively high. Observations made on the same pavement during the second and third years after completion indicated a measurable reduction in friction. According to these reports, this was caused by the asphalt progressively exuding from the joints in hot weather and covering a considerable percentage of the surface.

A prominent part of the work of the Research Bureau of the National Paving Brick Association has been concerned with the development of paving brick joint fillers that will not exude in hot weather. Consideration has been given to cement grouts, bituminized cement grouts, plasticized sulphurs, and bituminous fillers. Among the bituminous fillers, comparisons have been made between asphalts from different base crudes, asphalts of different softening points and penetrations, asphalt mastics, and straight pitches and pitch mastics. In the laboratory the properties and behaviors of the fillers were observed and interpreted in terms of practicability. Special emphasis was given to a test wherein the exuding or receding tendencies of the bituminous fillers were observed by subjecting filled brick panels (about 1 square yard in area) to prolonged periods of simulated summer temperatures. From these tests a number of fillers were selected as worthy of actual pavement trial.

In cooperation with the Ohio Department of Highways and the United States Bureau of Public Roads, a project was planned and completed (November, 1935) in which the entire length of 1¼ miles of new brick pavement on

* American Society of Municipal Engineers, Standard Specification, adopted October, 1935.

† Proceedings of the Highway Research Board, December, 1933, p. 169 and December, 1934, p. 131.

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Route 31 in Hocking County, Ohio, was allotted to a test of fillers. Of these fillers, 13 are in sections exceeding 300 feet in length, and 8 in sections somewhat shorter. During construction, observations were made to determine the practicability of application, including the surface removal of the fillers. While this pavement has been in service but little more than two years, the weather experienced has been exceptionally severe. During the winters there have been prolonged periods of sub-zero weather. The summers, of exceptional warmth, included periods during which temperatures exceeded 100° F.

The Ohio Department of Highways, basing its selection on satisfactory behavior in the test road to date, has designated four of the fillers for more extended use and further trial in brick pavement projects. In 1937 these four fillers were optional requirements on 12 projects. They can be described in general terms as follows:

1. A "blended" asphalt, 65 per cent midcontinent base and 35 per cent asphaltic base; penetration at 25° C., 23 to 32; softening point 101°-110° C.
2. A blended asphalt similar to the above, with 20 to 30 per cent finely divided mineral content; penetration at 25° C., 17 to 26; softening point 107°-116° C.
3. A special coal-tar pitch; penetration at 25° C., 35 to 65; softening point 60°-75° C.
4. A plasticized sulphur-asphalt mixture, with sulphur content 38 to 42 per cent; penetration at 25° C., 28-34; softening point 65°-75° C.

With the removal of the excess mat on top, a more thorough inspection of the pavement is possible. One consequence has been the requiring of end lugs instead of beveled ends (bulged). These lugs on each end are nonmeshing, so as to provide for free flow of filler, and function equally well when the brick are turned.

Base Courses

The requirements for foundations or base courses vary according to conditions of climate, subsoil, and traffic loads. In the southern section of the United States, vitrified brick surfaces courses are successfully used on such foundations as natural sand, gravel, crushed stone, slag, shell, and Florida lime rock. Brick pavements have of course given excellent service on bases of waterbound and bituminous macadam, of bituminous concrete, and of portland-cement concrete.

Concrete is the material commonly used as a foundation course for city streets and heavy-traffic pavements. With proper subgrade conditions, most engineers prefer a relatively lean concrete for the base. It will be less affected by temperature changes and, because of its lower tensile strength, the cracks that form are more numerous but narrower. The section of the base, separated by such narrow cracks, are displaced relatively one to another with greater difficulty than if the cracks were wider, as would be the case if the concrete were stronger; and hence are less likely to affect the surface course. Reinforcing with steel mesh or bar mats, usually in lieu of a richer concrete, is an increasing practice. Expansion joints in the base course are a cause of disturbance of the brick surface and are not recommended. With plain concrete, transverse weakened plane or construction joints are used to a considerable extent. As in concrete pavements, doweled longitudinal joints should separate the base into sections of one-lane width. With integral curbs, which perform the same function, thickened edges are not required.

In connection with the discussion of joints in concrete bases, it is apropos to mention that the monolithic type of brick pavement shows some signs of revival. In this design the brick are laid, without cushion, directly on the green concrete base and filled with cement grout. In an experimental brick pavement on Route No. 43 in Carroll County, Ohio, constructed in 1933, a section of monolithic pavement was included. The construction included a longitudinal center joint and 1-inch transverse expansion joints at intervals varying from 50 to 100 feet. A smooth surface was formed, and the section is now in perfect condition. Further projects of this design are contemplated. It would seem certain, however, that even if the monolithic type should again receive favor, the present standard brick pavement with cushion and flexible filler, which has proved its merits, will continue to be the preferred type for general use, particularly for municipal streets and resurfacing.

In December, 1936, the Ohio Department of Highways completed with Federal aid the construction of a section of brick pavement on Route 31 (located a short distance from the filler test road previously mentioned) in which the brick were laid longitudinally—that is, with the 8½-inch dimension parallel with the curbs. Longitudinal laying was not a complete innovation, since it had been used previously for car-track areas, parking strips, on grades, and, to a limited extent, in normal installations. However, this project was the first of its kind using modern construction methods. Contemplated advantages included smoother riding, reduction in traffic noise, spanning of base cracks lengthwise, a reduction in breaking of brick for transverse closures, economy in labor of laying because of unlimited length of rows, and the elimination of special wedge-shaped sections on curves. The project, completed in 1936, was 1.35 miles long, 20 feet wide over-all, had a concrete base, with 9-inch integral curbs, and used 3-inch vertical-fiber lug brick and standard asphalt filler.

An extension of this project for 1.5 miles using nonexuding filler was under construction in September, 1937. The specifications for the first project did not permit "batting," but it was necessary at infrequent intervals to cut brick at transition points. Also, because brick were respaced or shifted on the cushion, the resulting surface contour was not as smooth as expected. On the second project, batting will be permitted at one curb, and it is believed that the appearance of the pavement will not be noticeably affected, and that economy in laying and a smoother surface will result.

Continuous longitudinal joints would be of evident disadvantage if traffic were predominately steel-tired. However, this type of traffic is practically non-existent in the United States. The future performance of these projects in service will determine whether the apparent advantages of longitudinal laying are sufficient to justify a change in present standard practice.

Reinforced Brick Pavement

Reinforced brick masonry in which steel rods are embedded in the mortar joints has been used to a considerable extent in recent years in pavement construction. This is particularly true in California, where it is considered desirable because of earthquake conditions. In June, 1931, a reinforced brick pavement slab was installed in the driveway entrance to the plant of a paving-brick company in Illinois. Brick were placed in a "basket weave" manner with three brick constituting a unit. Reinforcement, consisting of ⅜-inch round deformed bars, was placed at 8¾-

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inch centers both ways, 1 inch from the bottom, and all joints were filled with 1:2 cement mortar. Two weeks after the slab was completed, an excavation was made under one side creating a clear span of 5 feet. It is estimated that during the past six years 25,000,000 paving brick have been trucked over the pavement, which shows no sign of distress over the excavation.

Encouraged by the success of this experiment, additional test installations are now being planned in Ohio and Illinois. Instead of using standard paving brick in basket-weave pattern, large vitrified units 3½ x 8 x 8 inches have been manufactured. They will be laid by hand in checkerboard pattern, properly spaced, and reinforcing rods will be placed in two directions in the cement-grouted joints.

Municipal Use

Vitrified brick are widely used as a paving material by municipalities in the United States. Engineers generally regard it as a superior type of surface for streets carrying heavy and destructive traffic, and it is frequently used for all types of streets in districts close to brick plants.

Many kinds of bases are used in cities but, as in rural road practice, concrete is most popular over the entire country. Mixes vary, but cities seldom use a mix richer than 1 part cement, 2½ parts fine aggregate, and 5 parts coarse aggregate, while the leaner proportioning known as the 1:3:6 mix is more widely used at present. A few cities use a 1:2:4 mix. Depths vary from 5 to as much as 10 inches, the popular average being 6 inches. There seems to be little other than individual preference to account for the wide variation in practice.

Beds or cushions used in municipal practice are also similar to those used on rural highways. However, in addition to the mastic beds, many cities are still successfully using plain sand.

In municipal work a 3-inch depth brick is generally used, and a wire-cut surface is exposed to traffic to avoid slipperiness. The rather complete motorization of all services in American cities, with the resulting elimination of the horse, has largely done away with the hillside brick, although some are still used.

The type filler in most general use in cities is a so-called hard asphalt with low penetration and a high melting point. Use of the softer asphalts has resulted in a substantial loss of the filler from the joints in hot weather, and slipperiness caused by the adherence of the filler material to the wearing surface of the brick. Use of the hard asphalts does not entirely cure this trouble, and materials of the experimental types previously mentioned are being tried for city as well as rural use.

In recent years many old brick pavements in cities have been re-laid, either on the old bases or on new foundations, which results in appearance and service value approaching those obtainable with entirely new construction. As the removing and cleaning of the old brick before re-laying is entirely a labor item, the cost varies with the wages paid. The cost of cleaning is also dependent upon the type of filler used in the original construction, varying between the extremes of plain sand and rich cement grout. In most of the old pavements the brick were laid on edge. When re-laid they are frequently laid flat, according to present-day practice, and there is a gain in surface area. This fact affects the percentage of salvage measured by the area covered by the re-laid brick. In some cases this has actually resulted in a salvage greater than 100 per cent, and a surplus of brick which were used for additional paving. However, the average proportion of salvaged brick is about 80 per cent. Owing to the increase in manufacturing costs since the brick pavements were originally constructed years ago, the re-lay value of the brick is in many cases materially greater than the original cost.

Handling Municipal Real Estate

THE model plan of Portland, Ore., for handling its real estate problems, particularly the acquisition and sale of tax-delinquent property, is outlined by the city's Commissioner of Finance, R. E. Riley, in the September issue of *Freehold*.

Because of the peculiarity of the general tax law, the city was forced to buy property sold for delinquent taxes at foreclosure sales. Any licensed real estate broker is authorized to sell this city property, but in order to increase its sale, a Real Estate Department was established under the supervision of the City Treasurer, who is under the Commissioner of Finance.

The Department is careful to set prices that represent reasonable values and yet will not disturb private values nor encourage further abandonment of property in the vicinity. Lots are sold under very liberal contract terms. The work of the Department has been very successful, as indicated by the large amount of city property sold, and the fact that the sale of private real estate has been greatly stimulated in sections where city real estate is located.

Along with this effort to sell property, the city is endeavoring to prevent the acquisition of more property than necessary. To this end, it has raised the requirements for any district for which it will make improvements. The inauguration of a special Collection Department to collect taxes on delinquent property has been another effective means of forestalling foreclosures.

Other forms of municipal real estate departments are described in the *Freehold* article:

San Francisco has a Real Estate Department under a Director of Property, which handles the sale and manages the leasing of all city real estate.

The Department of Revenue and Finance of Newark, N. J., plans in future to sell at public auction property which has been foreclosed. That which is not sold will be turned over to the Department of Parks and Property.

In Chicago, the Real Estate Bureau, as part of the Department of Finance under the Controller, has two divisions: one dealing with real estate owned by the city; the other with tax claims which the city holds as a result of the annual sale of private property delinquent on special assessments.

In Sacramento, Calif., the Property Sales Division has charge of the sale of tax-delinquent property. The city guarantees clear title to property sold, obtained either by deeds from record owners or actions in the Superior Court to quiet titles.

The Real Estate Division of the Department of Commerce in Rochester, N. Y., consists of an administrative office and a Sub-division of Maintenance, with a Superintendent of Real Estate and a Maintenance Supervisor. The Superintendent's office has supervision and control of all city-owned or leased real estate, except property in use by the Board of Education. It also prepares estimates of the cost of land required for public improvements, conducts the negotiations for purchase and sale of property, and follows through the closing of these transactions.

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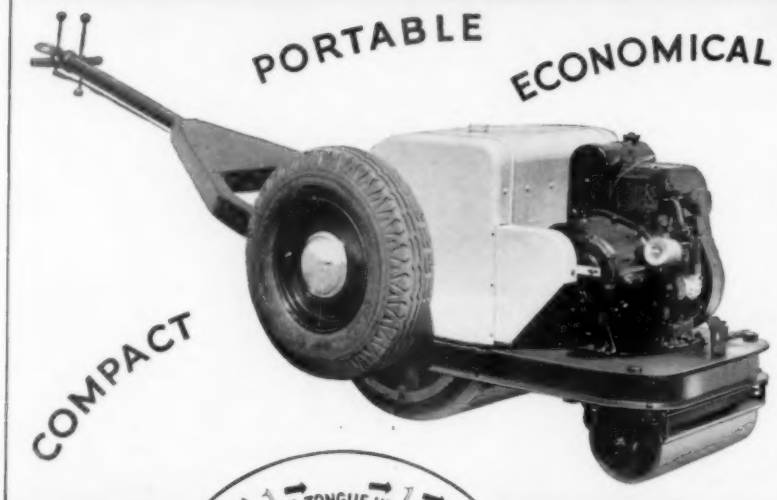

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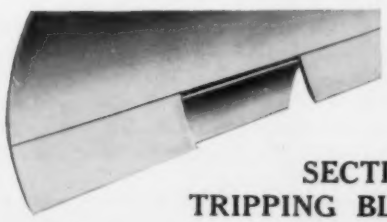

SECTIONAL TRIPPING BLADES

The Administrative Control of Ground Water

A Portion of a Report Made by a Special Committee for the Texas Planning Board

THE problem of ground-water regulation in Texas has received considerable study, because certain specific areas in which the ground-water supply is already overtaxed are in urgent need of some means to protect this supply from further withdrawals. Other sections are making greater demands on their ground water each year, which eventually will exceed the rate of underground flow. These sections will need to protect against lowering water-tables, which is the inevitable consequence of over-development. Still other areas are not now concerned with such problems, for they either depend upon surface water supplies, have no satisfactory ground-water supplies, or do not anticipate any intensive demand for ground water.

In its recent study the Water Resources Committee of the Texas Planning Board has gathered certain valuable information which we are pleased to pass on for the benefit of readers of THE AMERICAN CITY. Unlike surface water, ground water does not lend itself to precise measurement, and therefore information regarding its occurrence, rate of flow and quality cannot be predicted, except within rather broad limits. Records as to the operation of wells are not often kept over periods comparable to the length of stream records, which makes ground-water investigation still more difficult. The various geological formations in which water is found, and their chemical effect on the water, introduce still another uncertainty into ground-water study. In Texas, the wide diversity in water uses, climatic conditions, geology and industry must also be considered throughout any state-wide study of ground water.

The combination of all these factors and others of minor importance makes the problem of ground-water regulation one which requires the benefit of the best minds available. Not only must legislation for ground-water control be consistent with existing surface-water law, but it must be such as to benefit areas in need of regulation, and at the same time work no hardship on sections where regulation is now unnecessary.

Importance of Control in Texas

The real importance of ground water in Texas may be gaged more accurately when it is realized that more than three out of every four persons in Texas depend upon wells and springs for their water supply. All these people are by no means inhabitants of small towns in rural areas. Two-thirds of the Texan urban population, in communities over 2,500 population, goes to make up this group, including that of Houston, San Antonio, and about one-third of Dallas. Eight out of every ten urban cities in Texas depend upon wells for their water. In the rural areas, 95 per cent use wells and springs. Water for the remainder of the state's population is supplied from lakes and streams and is known as surface water.

Industrial users of ground water are in about the same proportion as the urban population. Most industries in Texas depend upon their city water systems to furnish their water, but where independent water supplies are provided, these are usually wells. This is particularly true in the case of large office buildings, which often have private wells to supply water for the operation of air-conditioning systems. Considerable waste of ground water in some of these systems results from using the water only once for cooling the air and then discharging it into the sewers. By the use of proper equipment and by proper regulation of such uses, this waste can be virtually eliminated.

In areas where irrigation from wells is feasible, the rate of taking water from wells during the irrigation season is much higher than in any but the most highly industrialized areas of Texas. It is in such areas, as well as in industrial districts, that the capacity of water-bearing strata is most likely to be exceeded. Contrary to popular belief, irrigation is not confined to the more arid portions of the United States. The cultivation of rice in Texas is carried on along the Gulf Coast where rainfall is apparently ample, but rice growing requires that the crop be partly submerged for a portion of the growing season. Large areas of rice are irrigated from wells near Beaumont and Houston.

The Laws of Ground-Water Control

It would be quite unreasonable to assume because one farmer, or even one town, takes water from wells that the supply in surrounding areas is in danger of exhaustion. On the other hand, it seems equally unreasonable where intensive use of ground water does exist that means of controlling that use within safe limits should not be provided. The law of ground water, as now developed, is less than a century old, whereas the law of surface water in the United States had its antecedents and development in the Roman Empire.

Few states exercise administrative control of ground water by actual statute, although many do so by virtue of court decisions. Only in comparatively recent times has ground water become important. The first case used as a precedent by the Courts of the United States was decided in England in 1843, and the controlling case was decided in 1857. In both these decisions ground water was considered as a mineral which could be extracted at will by the landowner without recourse on the part of others who might be damaged by such extraction. All American courts followed this rule for a while, but in 1862 the New Hampshire Court departed from it and promulgated the rule that the use of ground water must not be greater than reasonably necessary for the tract of land in which the water is produced. Under the former rule, exportation of water from one owner's land could be made even if it damaged others dependent either directly or indirectly on the ground water, but in the newer rule, exportation was not allowed if damage resulted. This is termed the "doctrine of reasonable use," or the "American rule." It is applied in a number

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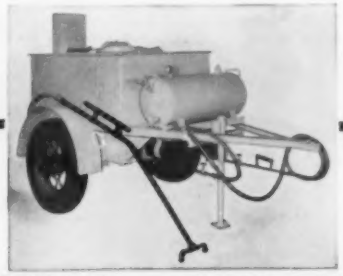

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of the states located in the humid sections of the United States; whereas, in others, the former doctrine of what may be termed "unreasonable use," or the "English rule," still prevails. The status of the law as to underground waters in the various western states is given by Harold Conkling, in "Administrative Control of Underground Water: Physical and Legal Aspects," published in the transactions of the American Society of Civil Engineers, Vol. 102, 1937, as follows:

Arizona.—There are no statutes on underground water in Arizona. The Court has ruled that such water is not subject to appropriation (*Maricopa County Municipal Water District v. Southwest Cotton Co.*, 1931, 4 p. 2d, 369), and at first, reserved decision as to whether the English rule or the correlative doctrine which originated in California should prevail; but in 1934 (*Fourgan v. Curtis*, 29 p. 2d, 722), it decided in favor of the American doctrine of reasonable use; that is, that the water belongs to the land under which it is found, and could be taken to distant lands if injury did not result to another on the stream system. In the case of *Pima Farms v. Proctor* (215 p. 369, 1926), the underground water in a stream valley several miles wide was in question. No surface flow exists except in flood times. The Court rules that this was a definite underground channel (the litigants stipulated at the outset that the water involved was the immediate underflow of the river), that the prior user of underground water had a vested right to the maintenance of the water level, and that subsequent users must deliver water to him at no greater cost than had been incurred prior to the new use. This is similar to declaring that a prior appropriator of surface waters had a vested right in the means of diversion; in fact, the Court states that this is the law, but cites no decisions to that effect.

California.—There are no statutes on underground water in this state, but it may be appropriated by taking on sufferance of the overlying landowners. These appropriations ripen into a right after five years of open taking, and are so recognized by the Court. No exclusive rights are permitted in underground waters except the appropriations previously noted. Cities and other municipal organizations are regarded as appropriators even if they are located directly above the underground basin. All overlying lands, and lands riparian to a stream where the percolating waters feed a surface stream, have a correlative and equal right to the stream system whether water is on the surface or underground (that is, percolating). A diversion from a surface stream made prior to 1914 may be an appropriation even if on riparian land, and, as such, proscription obtains against an underground water user below who may be supplied wholly or in part by percolation from the surface stream.

The law of waters in California, both surface and underground, is highly developed and rests on reasonable use and the correlative doctrine of equal rights.

Colorado.—Underground water is not mentioned in Colorado statutes as subject to appropriation. The Courts have held that it is subject to appropriation, however, and subject to the same regulation as surface water. Rights under appropriation are in order of priority of filing on the stream in question. The Courts seem to be tending to the rule that in Colorado all waters, whether surface or underground, are presumably tributary to a surface channel, and that their taking is thus subject to prior appropriation of the surface stream.

In Colorado the taking by an underground user is stopped if it decreases the surface flow available to the down-stream user even if the down-stream user could sink pumps to the underflow and get a full supply. This amounts to a guaranty of the method of diversion previously discussed. The theory of underground water law in Colorado is consistent with that of surface streams, but the application varies in the afore-mentioned particular. The waters of an entire stream system are treated as one.

Idaho.—Underground water is not specifically mentioned in statutes in Idaho. The Court concurs in the doctrine of appropriation of underground waters, and states that it may be by the procedure of the water code, or by taking (*Silkey v. Trego*, 5 p. 2d, 1049, 1931.) The subsequent appropriator of the underground water must not lower the water-table from which the prior appropriator pumped (*Noli v. Stonen*, 26 p. 1112, 1933). In other words, a prior appropriator is protected in his means of diversion when underground water is in question.

Kansas.—All underground waters in the northwest quarter of the state are, by statute, subject to appropriation. Disputes on underground water have not been before the Court to any great extent, but so far decisions appear to be based on the English rule.

Montana.—There are no statutory provisions for the appropriation of underground water in Montana. Conflicts involving underground water have not been frequent. A case decided in 1912 followed the English Rule (*Ryan v. Quinlan*, 124 p. 512).

Nebraska.—There is no legislation concerning underground water in this state, but in 1933 the Court declared in favor of the doctrine of reasonable use (*Olson v. City of Wahoo*, 124 Nebr. 802).

Nevada.—The statutes provide that all water within the state, whether above or below the ground surface, belongs to the public and may be appropriated for beneficial use as provided in the act and in no other way; but it specifically eliminated percolating water, the course and boundaries of which are incapable of determination. Use of underground water is not great, and details of administration have not been established by state authorities. There have been no recent court decisions on the matter.

New Mexico.—In 1927, a statute as to appropriation of underground waters was passed in New Mexico but was declared unconstitutional in 1929 because of faulty title. In 1931, a new act, designed to satisfy the Court's objections to the first, was passed by the Legislature. The statute applies to waters of underground streams, channels, artesian basins, reservoirs, or lakes having reasonably ascertainable boundaries, and declares them to be public waters and subject to appropriation. As a result of the definition, waters diffused and percolating toward a stream in the manner customary in humid countries may not be included.

As a result of investigation, the State Engineer of New Mexico has declared three basins as coming within the scope of the law. Two of these are basins in which the water is not under pressure, but in a condition such as that defined previously under the heading, "Percolation Through Basins." The other is the famous Roswell artesian basin previously mentioned. The degree of coordination between procedure in the case of underground water and surface water in the same stream system is not apparent in the statute or the procedure outlined by rulings of the State Engineer. Apparently, the State Engineer proposes to accept filings only in those basins which have been examined and which have been declared to come within the purview of the statute. The Court has declared that adjudications should embrace both ground and surface water in one proceeding (*El Paso and R. I. Ry. v. District Ct.* 8 p. 2d, 1064, 1932).

North Dakota.—The statutes of North Dakota declare underground waters to be in the same ownership as the land on which they are found. No court decisions have been made.

Oklahoma.—The statutes of this state make no mention of underground water and court decisions on the question have not been found.

Oregon.—All waters, according to the Oregon statute of 1909, may be appropriated for beneficial use. In 1927, underground water east of the Cascades was declared subject to appropriation when it occurred in basins the boundaries of which could be defined with reasonable certainty. As finally amended in 1932, the statute as to underground waters still limits appropriation to the areas east of the Cascades and conforms to the law of New Mexico. Applicants for appropriations follow the general procedure outlined for surface waters. Development is proceeding east of the Cascades. There are no recent court decisions as to the status of the underground water in Oregon.

South Dakota.—The statutes in force in South Dakota are "silent" on underground water. All court decisions uphold the common law doctrine of absolute ownership and unreasonable use.

Texas.—There are no statutory enactments as to underground water in Texas. All court decisions uphold the doctrine of absolute ownership of underground water.

Utah.—By a number of decisions, the Utah Court has held that owners of overlying land have co-equal and correlative rights in underground water (*Katz v. Walkinshaw, Supra*) and also that such owner may export his pro-rata share to distant points. The controlling case is *Glover v. Utah Oil Refining Co.* (218 Pac. 955, 1923). In the case of *Wrathall v. Johnson* (1935), the Court—in a peculiarly divided opinion—held that the use of underground water is by appropriation even if on overlying land, and is subject to the same restrictions as prevail for appropriations of surface water. This was a decision on demurrer and cannot be regarded as conclusive.

The Legislature of 1935 enacted a statute placing underground water in the same status as surface water; that is, as a right secured only by application for appropriation to the office of the State Engineer. This act follows a model recommended by the Association of Western State Engineers and is similar to the New Mexico statutes.

Washington.—All water in the state of Washington is declared to be subject to appropriation, which would include underground water, but state officials consider that no authority is conferred on a state over such waters. One court decision on underground water adopts the doctrine of reasonable use on overlying lands; another, that underground water may not be taken to the injury of surface water diverters from the stream. The doctrine of the courts is not well defined.

Wyoming.—No mention is made of underground water in the statutes of the state; nor are there recent court decisions to clarify the law.

All Other States.—The only attempt at statutory control coming to the notice of the writer is in New York State where wells on Long Island drawing more than 100,000 gallons per day are placed under the jurisdiction of the State Conservation Commission.

Summary by Harold Conklin

"Summing up the results of the foregoing examination, there are found to be four doctrines of law in the United States on which use of underground water is based: (1) absolute ownership of water because of the ownership of the land beneath which the water is found, with no obligation to respect the rights of others, is herein termed the 'doctrine of unreasonable use,' or the English rule: (2) absolute ownership of water to the extent of reasonable use on the land beneath which the water is found, but with no right to export to distant land if by so doing damage is caused to another, is herein termed the 'doctrine of reasonable use,' or the American rule: (3) ownership, co-equal and correlative with that of every other landowner, of water lying over the basin, or riparian to a stream fed by water rising from the basin, is herein termed the California doctrine; and (4) entire lack of ownership on the part of the proprietor of the land, but ownership by the state instead—which allows use by appropriation under a procedure set by the state, or otherwise, and which is subject to prior rights of other users whether from a surface stream or from underground sources tributary to the stream—that is, the doctrine of prior appropriation. *These differences are successive and cumulative impositions of control, or, broadly speaking, the police power as found desirable because of growing use of underground water, and as found possible because of increased knowledge of ground water hydrology.*

"Unless analyzed, these diverse doctrines would seem to entail endless confusion, but when it is remembered that there is also great diversity of climate in the United States and also great variation in the present stage of development and possibilities of future development, the probable confusion appears not to be very great as a whole although potentially bad enough in limited areas. The worst legal confusion could result from lack of consistency between surface-water law and underground-water law in the same general region; but even where these laws are inconsistent the climate may be such that costly development is impossible, and, if so, the conflict may be more apparent than real."

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Conditions in New Jersey

In New Jersey there has been a partial control of ground water by the state since 1907. This has been accomplished by laws which provide that new or additional developments of water, either surface or underground, for the public supply, by municipalities or privately owned water-supply companies, cannot be made until the supervising commission, the State Water Policy Commission, has approved the plans for such development. Favorable action by the supervising commission apparently does not constitute a grant of any right to use the water, but merely an approval of the plans. However, the Attorney General of the state has ruled that the state has control over the draft of ground water. The law has had the effect of controlling to some extent the development of ground-water supplies in certain areas where there is danger of the safe yield being exceeded, either by actual refusal of approval, or by modifying provisions as to the location of wells or the quantity to be withdrawn.

In New Jersey the law does not apply to diversions of ground water by industries or others using the water for purposes other than public supply systems. This distinction has caused a peculiar situation, in that upon showing that a proposed development for municipal supply may injure an existing private supply, the controlling commission may refuse, and has refused on occasions, to approve the public development. On the other hand, a private development may be made which may greatly reduce the capacity of the wells of the public system or perhaps even destroy its usefulness. In such cases, the Commission is powerless.

Insulating Refractories for Municipal Incinerators

By V. L. WHITACRE
District Engineer, Power Products and Industrial Department,
Johns-Manville Sales Corporation, New York City

A REVIEW of the refractory and insulation fields reveals that manufacturers and consumers are working together to develop materials suitable for more exacting service. The trend continues toward a wider use of insulating refractories and more advanced methods of insulation. Increased attention has been paid to furnace design and insulation as affecting refractory life. In some cases, plastic and castable insulating refractories have been substituted for bricks or shapes, resulting in lower cost.

Development

The development of insulating refractories has taken place in two directions. First, prominent manufacturers of refractory brick have realized the advantages of incorporating insulating characteristics with their refractory products to conserve heat and reduce wall thickness. Secondly, prominent manufacturers of insulating materials have realized the advantages of incorporating refractory characteristics with their insulating products to produce a material suitable to direct exposure to furnace temperatures. Both developments have two common aims; namely, to conserve heat and to offer refractory characteristics. It is the purpose of this paper to discuss, briefly, the properties most desired in any insulating refractory.

Most efforts to date have been directed toward producing an insulating refractory with as high a thermal resistance as possible without too much sacrifice in strength, the latter being generally directly proportional to the bulk density of the product. For example, consider the variation in thermal conductivity and the density of an insulating refractory brick to a regular commercial firebrick. On one extreme, diatomaceous earth brick have a density of approximately 38 pounds per cubic foot dried, with a conductivity value of approximately 1.8 at 800 degrees F. mean temperature. At the other extreme, the regular commercial firebrick with a density of 130 pounds per cubic foot has a conductivity of about 7.4 at the same mean temperature. In general, the average insulating firebrick will be found to have about one-third the density and one-fourth the thermal conductivity of ordinary fire-clay brick.

Insulating refractories are finding increased favor for furnaces operated intermittently. Composite wall construction consisting of dense refractory brick with a backing of insulating brick or blocks is favored for furnaces operating continuously. There has been a definite improvement within the past few years in the quality of insulating brick produced. Insulating refractory brick were first used directly exposed in electric furnaces only, later in gas-fired furnaces and now are used directly exposed in oil-fired furnaces and practically any combustion condition. Operators of metal working furnaces seem to have been the first to realize on the use of insulating refractories and so far they have received their widest usage in forge, heat-treating and annealing furnaces. When care is taken not to subject the brick to temperatures higher than those recommended by the manufacturer, they can be used in furnaces with neutral, reducing or oxidizing atmospheres and will show good life; some installations have been in furnaces four to five years.

Effect on Construction

Insulating refractories have made possible the use of thinner and lighter walls and arches. The chief function of heavy furnace walls is to confine heat and support heavy roof loads. Suspended walls and roofs have progressed to the point where heavy supporting masonry is not as necessary as in the past, and small furnaces constructed entirely of insulating firebrick are not uncommon.

The use of insulating refractory is becoming more im-

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portant in all heated equipment, and every piece of such equipment should be studied carefully with the thought of using insulating refractories in certain sections, if not throughout. As failure in insulating refractory is much more serious than in insulating brick or blocks behind firebrick walls, the following factors should receive consideration:

Uniformity is of great importance because of the thinner wall constructions used. Accurate sizing of all standard brick and standard shapes insures tight joints. Shrinkage of the insulating refractory should be low. The structure should be free from defects such as cracks, voids, stratifications or soft centers, and of equal strength when laid flat or on edge.

Effects of expansion should be minimized as much as possible. Resistance to spalling is necessary, especially in intermittently fired furnaces. The principal demand made on these bricks is to allow a furnace to be brought up to temperature quickly. The heat capacity or stored heat of any material in a wall construction is the product of its weight multiplied by its specific heat multiplied by the temperature rise from the room to its mean temperature. Therefore, it is essential that the weight and specific heat of the insulating refractory be kept at a minimum. Physical strength should be ample at high temperatures, particularly in arches.

Insulating efficiency is one of the principal items or characteristics in an insulating refractory. The over-all ratio between walls of insulating refractory brick and firebrick should be about 6 to 1 in the matter of heat storage and insulating efficiency. The fusion point should be high enough that a sudden peak of furnace temperature will not soften the insulating refractory brick. The modulus of rupture is of importance in some furnace constructions and should be at least 75 pounds per square inch.

Monolithic Construction

In recent years there have been developed dry, hydraulic-setting refractories for monolithic construction. This product is 40 per cent lighter in weight than firebrick and has a composition which is chiefly a pure clay of high alumina content, calcined at high temperatures. The material has unusually low heat storage capacity, low thermal conductivity, and a working temperature limit of 2,400 degrees F., in addition to possessing all the other characteristics requisite to a first-class refractory. Plastic insulating refractories can be poured in any desired shape. It hardens rapidly under ordinary atmospheric conditions and, if necessary, can be placed in service after 12 to 24 hours of air curing. The material has remarkable resistance to spalling and will withstand direct exposure to flame temperatures. However, it is not recommended where it will be in direct contact with molten metals or highly abrasive materials. Because of its low heat-storage capacity, it is particularly recommended for use in intermittently operated furnaces, while its low thermal conductivity makes its use also advantageous in continuous operation.

Conclusion

Insulation refractories have a definite position in the industrial field, and, while there are some limitations for the use of such a material, the present field and new or future developments will provide an ever increasing sales volume for the product.

High-Temperature Cements for Municipal Incinerators

By W. H. GAYLORD, JR.
M. W. Kellogg Co., New York City

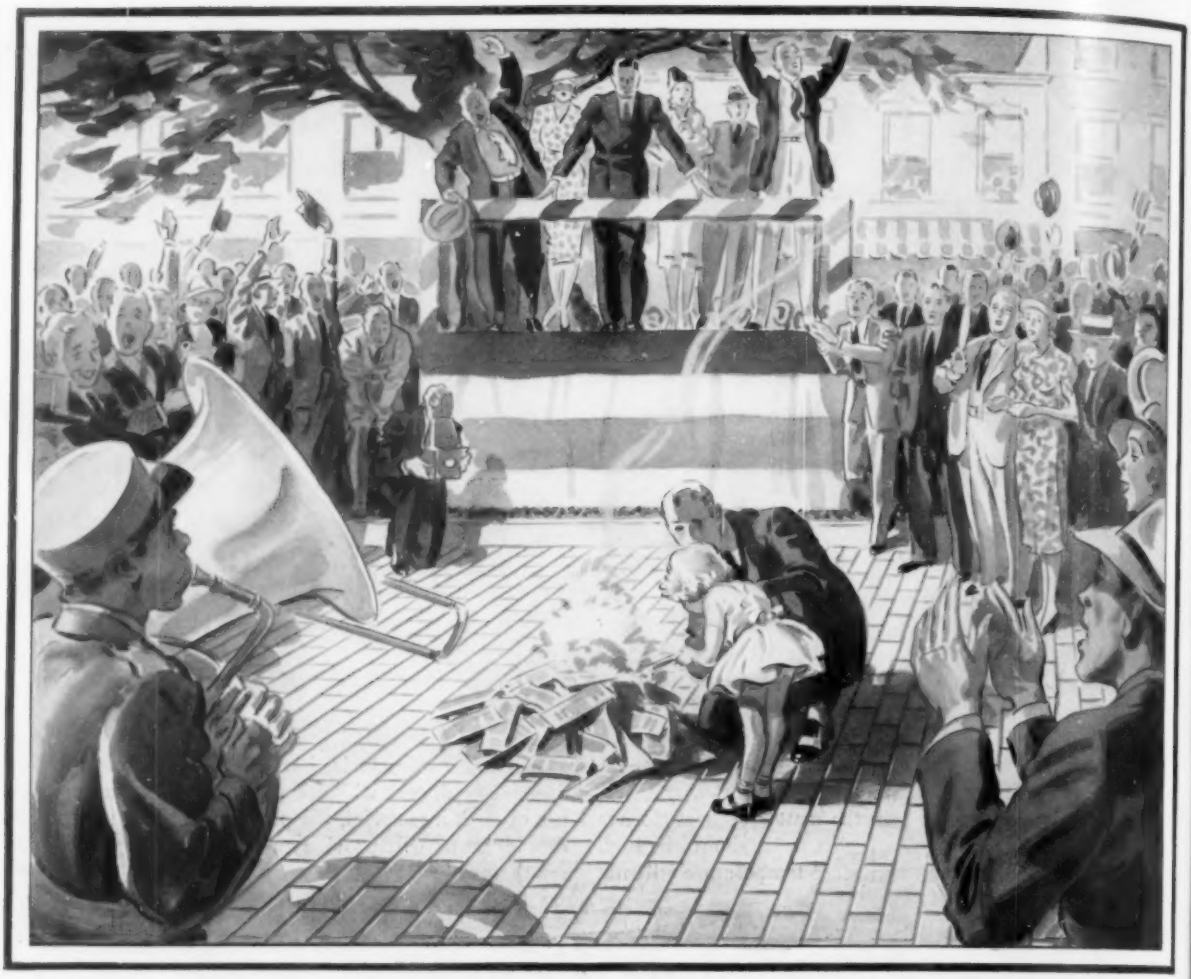
TODAY high-temperature cements are recognized to be as necessary to good refractory construction as portland cement is to good building construction; in fact, more is required of a high-temperature cement in the refractory field than is expected of portland cements in the construction field. Ability to withstand high temperature, rapid changes of temperature, creating thermal shock, resistance to fluxing agencies, are only a few of the many things required of a high-temperature cement, in addition to those functions of any cement used purely for construction purposes.

In the year 1895 several refractory cements had been produced and were helping to solve the new situation of increasing furnace temperatures to such an extent that further study was made of the use of different base materials to meet the reaction of different chemicals produced in the burning of different kinds of fuels. In the year 1900, these cements were being used extensively by the larger utilities as well as in the metallurgical field, and tests were then started in a practical way by the prime movers committee of the National Electric Light Association. In 1923 a printed report was made by this Committee showing that high-temperature cement was increasing the life of refractories and meeting the new conditions produced by new combustion methods to such an extent that it was possible to further improve combustion equipment without excessive increase in refractory maintenance costs.

Service of Refractory Cements

No one cement is a cure-all, so today a reliable refractory cement manufacturer is able to furnish that type of cement that will absolutely meet the particular problem best.

High-temperature cement, in addition to giving refractory structures, such as municipal incinerators, greater strength, protect the edges of firebrick or shapes against the action of flame, acidity of gases and molten ash, which is the commonest cause of rapid deterioration. Fire-clay used in the old days was, at its best, only a filler, for it shrinks, crumbles, blows out, and exposes the edges of the



FORMULA FOR BOND-*BURNING* CEREMONIES

Bond-*burning* ceremonies crop out in the news. It's a fine American custom—pleasant comment by civic leaders and happy "asides" among the taxpayers—as the torch is held to the cancelled bonds. And the pavement still good for years of service!

* * * * *

50 YEARS OF SERVICE

St. Paul, Minn., Virginia Ave., has completed a half-century of service. Neither weather nor traffic could best it. "It's still serviceable," says George M. Shepard, Chief Engineer, Dept. of Public Works of that city.

* * * * *

Baltimore, Md.—The oldest streets paved with brick still in use were put down 39 years ago, on a sand base. I rode over these early brick streets recently, and, considering that they were laid by builders of the abutting houses, I found them to be in good condition, except that the surfaces were somewhat wavy; but, no doubt, they will be used for a number of years to come.

I also inspected the first brick street laid on a concrete base by the City, uuder my supervision in 1901, around one of our public markets. Despite the heavy traffic, this street is in fair condition.—Frank K. Duncan, Asst. Chief Engr., Dept. of Public Works, Baltimore, Md.

A study of brick pavements in Des Moines by Iowa highway authorities concludes that service will average 36 years; Columbus, Ohio, reports over 500,000 square yards which has already averaged 45 years of service; records of individual pavements run still higher.

The costs of upkeep on brick pavements is very low—often ranges from negligible to nil. The reason: Brick resists damage from weather as well as traffic. As built today it gives a durably smooth, safe passage to any type of traffic. National Paving Brick Association, National Press Building, Washington, D. C.

BRICK

FOR NEW CONSTRUCTION OR RESURFACE JOBS

brick, as well as leaving open joints.

Refractory cement cuts down heat losses, because open joints between the brick are eliminated, the insulation is protected from furnace gases and air which might otherwise be drawn through the walls when the furnace pressure is positive.

It is a well-known fact that firebrick in general soften at temperature at least 500 degrees F. below their melting point, and when fire-clay is used, softening of the brickwork is hastened by open joints or cracks in the setting. Brickwork protected with the proper refractory cement will stand higher temperature because the heat has access to the brick only on the face. Spalling is decreased, because there is a more uniform temperature gradient through the brick.

Tightly sealed joints reduce clinker hold and prevent impregnation that would in many cases pull out the brick when the clinker were removed.

Through the use of high temperature cements it is possible, in addition to getting a true bond throughout the entire thickness of the wall, to get a much thinner joint; in fact, so thin that the joints will average 3 per cent or less of the wall height.

There are manufacturers who specialize in the production of refractory cements, and who have staffs of research and refractory engineers. Their recommendations, after a study of a municipal incinerator or steam plant with reference to the type of cement that will best meet the problem, will invariably result in the elimination of joint trouble or structural weakness, insuring increased life for the brickwork and a lower maintenance cost.

Cements are made to meet and resist the action of all kinds and types of slags and gases, and through the use of this bonding medium, repairs, when necessary, can be made without a reconstruction program, and in most cases can be used with absolute safety, even when the walls to be repaired are still hot.

Conclusion

High-temperature cement is as necessary in refractory construction as portland cement is to the building or construction field.

No one refractory cement is a "cure-all."

A different refractory cement is made to meet each and every refractory problem.

Much can be gained by consulting a manufacturer who has developed a complete line and who is able to serve with unbiased mind, with one responsibility for service to be secured through the use of one or more types of cement.

From Spaciousness—to Congestion—to Spaciousness Again

THESE twelve views of the evolution of group housing are reproduced from a double-page spread in a 9-page article in *The Architectural Forum* for September, 1938, on "The Standardized House." The article points out that standardization works up as well as down, that historically it was a factor in all good architecture, and that in terms of the present it may well represent not only an economic, but also the esthetic solution.

1. American Indian village. 2. East African native dwellings. 3. Mud houses in the Tunisian Sahara. 4. Village in New Guinea. All four illustrate the complete regimentation imposed by primitive materials and construction methods. 5 and 6. Typical medieval English village streets, much of whose picturesque charm is due to the repetition of standard design elements. 7. Old houses, London. Laws determined the street width, economics the overhanging stories, and structural methods the characteristic timber and stucco treatment. 8. 16th century building in Rouen: variation within the limits of accepted standards. 9. Row houses in Haarlem. 10. Row houses in London. 11. Row houses in New York. All illustrate the architectural effectiveness of repetition. 12. Twentieth century standards, with light and air entering as new factors

BARGAINS *in snow removal*

You can't tell what the weather will do in the next few months. But regardless of how much snow falls, you can get it out of the way — *cheaply* and *quickly* — with "Caterpillar" Diesel power! And that gives the City Treasury a break, as well as the merchant and worker. For, when streets and sidewalks are free from the snow blockade, business goes on as usual!

Talk to your nearest "Caterpillar" dealer to find the equipment that best fits your needs. But the two instances, herewith, will give you some idea of how *cheap* and *easy* you can make snow removal this Winter!

The "Caterpillar" Diesel No. 11 Auto Patrol is owned by the city of Des Moines, Iowa. Last year it cleared ice and snow from the streets at the rate of 11 to 15 miles a day . . . and at the very low *over-all* cost of only $1.06 per hour!

The tractor is owned by the city of Winnipeg, Manitoba, Canada. A small, 25-horsepower machine, it is equipped with a one-way snow-plow and makes a thorough, fast, economical job of clearing snow-bound streets and sidewalks!

Either of these machines, or any other of the many in the "Caterpillar" Diesel line, will more than justify their purchase during one bad Winter. But don't, for one minute, think you'll lay them up after the snow is gone! These are *year-round, all-purpose* machines . . . for building and maintaining streets and alleys . . . handling rubbish at the dump . . . working in the city parks . . . doing one and a hundred jobs at a *low* fuel-and-maintenance cost.

SEE YOUR NEAREST "CATERPILLAR" DEALER BEFORE WINTER GETS UNDER WAY

"Caterpillar" Diesel No. 11 Auto Patrol owned by Des Moines, Iowa. It is clearing 11 to 15 miles of street per day . . . at an over-all cost of only $1.06 per hour! Average cost, per mile of snow removal for Des Moines with this machine, is 79c. The old method, clearing only 5 to 7 miles per day, cost Des Moines $2.46 per mile! In addition to clearing snow, the "Caterpillar" Diesel Auto Patrol will make and maintain streets and roads, shoulders and ditches. Blade, grade, scarify. Get streets ready for Winter. Restore them when Winter goes!

"Caterpillar" track-type Tractor, with one-way snow-plow, clearing streets and sidewalks in Winnipeg, Manitoba, Canada. The operator has the advantage of extraordinarily responsive steering for close work! Summer jobs, for "Caterpillar" track-type Tractors, include grading, garbage-removal, and park maintenance.

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Municipal Asphalt Paving—Trends and Construction Practice—Part II

By W. R. MACATEE
District Engineer, The Asphalt Institute, Cincinnati, Ohio

Maximum Mixing Time

Limited mixing time likewise plays an important part in constructing crack-free surfaces. There is a definite trend toward limiting the mixing time for producing sheet asphalt to 60 seconds. Forty-five seconds appears to be the limit for asphaltic concrete after the ingredients are in the mixer, and then half-emptied. A somewhat shortened cycle of approximately 35 seconds is set for mixing base and leveling courses. These maximum time limits apply to hot-mixes, and are in addition to dry mixing. They are established only for plants capable of producing satisfactory mixes in the periods shown.

Seal Coats

It is highly important that seal coats be provided on low-cost surfaces at least before the first winter following their construction. No harmful effects result if compressed surfaces are allowed to cure no longer than several weeks.

Hot- and cold-laid types of sheet mixtures, plant-mixed, have been used to some extent for seal coats on road-mix surfaces. These have given excellent service and are usually applied at the rate of 15 to 60 pounds per square yard. Liquid asphalts are used extensively for this purpose.

The great importance of providing seal coats on compressed mixtures which are permeable to air has previously been referred to by quoting Hubbard and Gollomb earlier in this paper. Pre-coated, fine aggregate may be used on surfaces on hot- and cold-laid asphaltic concrete so they will be made impermeable to air, and possess a high degree of skid-resistance.

I have observed some instances in which seal coats have been applied to newly constructed sheet asphalt. This practice was followed on an approach road at Richmond, Va.

Permeability Tests

Hubbard and Gollomb have stressed the need for impermeable asphalt mixtures to prevent oxidation. However, they made no mention of test methods to determine surface permeability. This was likely due to the fact that the late C. S. Pope, of California, had already quite ably covered this subject in his development of a device known as the Permeometer. This device, consisting of a graduated, funnel-like tube holding a given quantity of water, is sealed tightly to cleaned pavement surfaces and water poured into it. The rate of leakage is then observed to determine the need for seal coating the surface of the pavement.

Permeability Limits

Pope provided the following rules concerning the need for sealing:

"Sealing should be required on various surfaces when permeability tests made as above show leakage in excess of 2½ cc per square inch of area tested in less than the period of time reported below:

On bituminous macadam.....120 seconds
On oil mixes, cut-backs, etc.....180 seconds
On asphalt concrete.....180 seconds"

Headers

Headers are not required next to asphalt surfaces in suburban areas where pavements do not extend to the gutters. Gray and Hubbard point out that building portland cement concrete edging for such pavements is not only a wasteful extravagance, but also detrimental to the pavement itself.

Where hot-mixed types of asphalt surfaces are installed without headers, it is excellent practice to paint-coat the vertical edges and to extend the paint coat by allowing it to lap over the surface course 4 inches from the edge. Just enough hot asphalt, 50 to 100 penetration, or cut-back asphalt, RC-3, should be used to effectively seal all the areas included.

Asphalt Priming Material

A prepared base such as rolled stone, gravel and sand-clay should be treated with an asphalt primer before road-mix or plant-produced surfaces are placed. Medium-curing liquid asphalt, MC-1, is nearly always used for this purpose. This low-viscosity material is readily and completely absorbed by the surface. It is allowed to harden to consolidate and partially waterproof the prepared base.

MC-1 has proved extremely satisfactory as a primer. Primers are not recommended for use without subsequent treatment of the surface with asphaltic mixtures, except perhaps in the case of well-drained and well-consolidated earth streets. The city of Cleveland has many excellent examples of streets now in the initial phase of stage-construction, in which MC-1 alone has been used in developing surface stability preparatory to placing more substantial surfaces in the future.

Black Base

Paving officials in cities have not kept up with rural highway engineers in the matter of black base construction. Many exceptions to this, however, are found in the fast-growing cities on the Pacific slope and elsewhere. The ever-changing transformations made necessary by the

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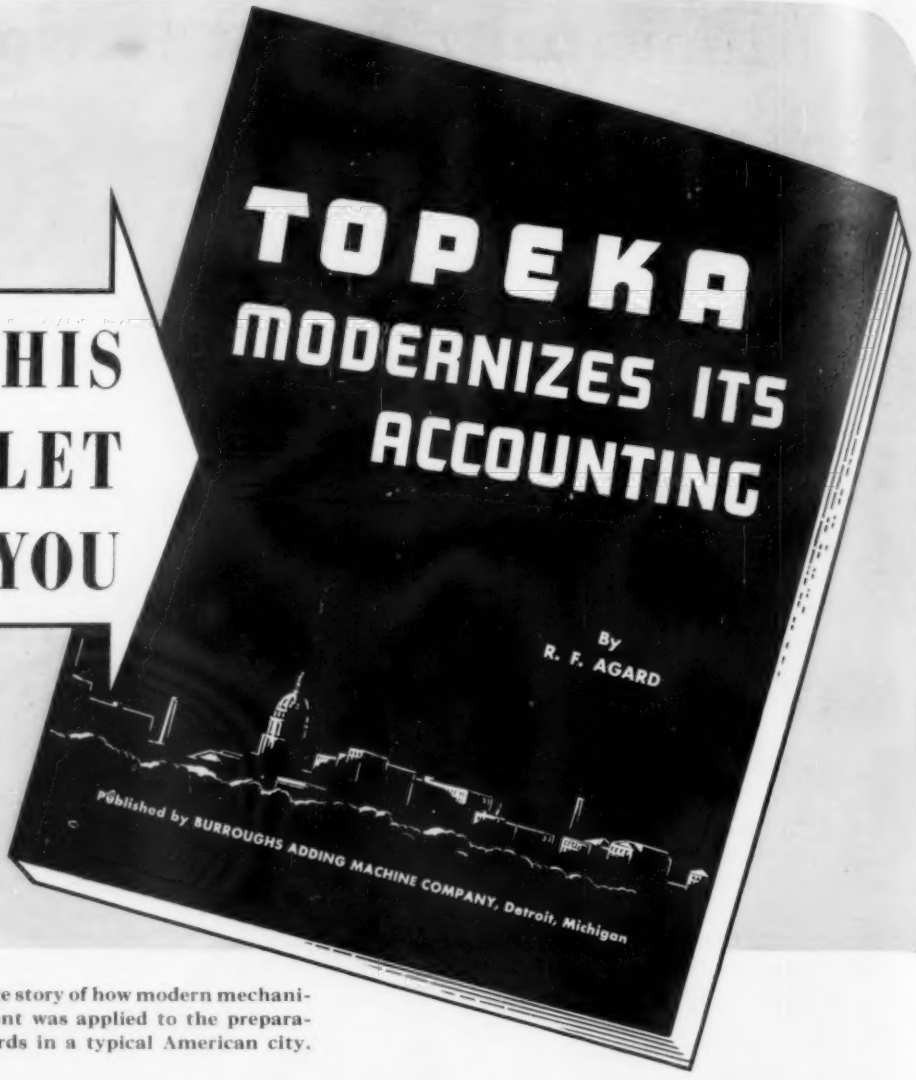

The complete story of how modern mechanical equipment was applied to the preparation of records in a typical American city.

When the City of Topeka decided to redesign and modernize its accounting, the problem of mechanizing the new system was an important one. A comparison of machines and machine features led to the selection of Burroughs equipment. This 72-page booklet clearly describes how this equipment is employed to simplify the keeping of Topeka's records, and to make them immediately available when required. Included are forms, illustrations of typical entries, financial and statistical reports—giving a complete picture of the accounting system. While the details will not apply to every city, the principles can be applied to any city's accounting.

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growth of these cities have doubtless been the driving stimulus to paving engineers in those regions to develop and perfect the black base foundations in extensive street programs.

An example of an extensive municipal paving program —by which black base consciousness is developed—is found in the three-year program just concluded in Spokane, Wash. This involved 34 miles of asphalt streets, using black base and asphaltic concrete surface.

Composite Type Pavement Foundations

In limestone and trap-rock regions, a composite type of pavement foundation has long been used. They often consist of quarry wastes with or without asphalt, laid down on the subgrade as an insulating course, ranging in thickness from 1 to 3 inches. These are followed by one or more courses of waterbound macadam, or a single (or multiple) course of asphaltic macadam constructed by the penetration method. Where asphaltic types of foundations are used, the plant-mixes are, however, probably becoming more in demand than penetration macadam bases.

Wearing Surfaces

Asphaltic concrete wearing surfaces appear to exceed sheet asphalt in popularity where the plant-mix type of black base construction is practiced. Exceptions to this are to be found in municipalities in the Carolinas, Florida and other places where sand-asphalt base courses and wearing surface designs have been "borrowed" by city paving authorities from their brother-engineers who developed this form of construction for rural highway use where sandy subgrades are the rule. In New York State and also many cities in New England, as well as in Oregon, the asphalt macadam wearing courses are still popular for use on penetration macadam type of black base, or rolled stone bases.

Cold Mixes

Cold-mixed types of asphaltic concrete have been used somewhat less extensively than the hot-mixed type. Nevertheless, they are growing in popularity and are being aggressively marketed by permanently established cold-mix plant operators. One reply received objected to this type, owing—it was stated—to its permeability. The objection could be entirely overcome by following the practice outlined in the below-quoted comment:

"Where cold-mix, liquefier types of asphaltic concrete surfaces are installed, it is good practice to seal such surfaces by means of pre-coated fine aggregate, spreading it uniformly on the surface after initial rolling and before final compaction. The fine aggregate should pass the No. 10 sieve with 60 per cent or more retained on No. 50 sieve, and contain approximately 2 per cent of suitable asphalt material to pre-coat it. After the fine, pre-coated aggregate has been spread at the rate of 4 to 7 pounds per square yard of surface, it should be subjected to a thorough rolling. Such seals serve to prevent porous surfaces and likewise provide excellent skid-resistance."

Somewhat the same practice has been recommended for use in hot-laid asphaltic concrete. This is recommended for hot-mixes for constructing into the surface a high degree of skid-resistance, and also to reduce to a minimum the surface permeability to prevent moisture and air from oxidizing the thin films of asphalt surrounding the particles of aggregate constituting the surface course.

Resurfacing Old Pavements

Paving engineers use many types of asphalt mixtures for reclaiming old pavements. These operations vary from simple surface treatments to more substantial thicknesses of (a) road-mixes—generally of the retread type using sturdy, crushed and uncrushed aggregate, (b) hot and cold, plant-mixed asphaltic concrete, (c) sheet asphalt and (d) asphaltic macadam, penetration method. The thin, inexpensive surface treatments have predominated for rehabilitating old bituminous surfaces, whereas in reclaiming cement concrete and block types of pavements, substantial thicknesses of asphaltic concrete, hot- and cold-laid, appear to have been used more extensively than asphaltic macadam or sheet asphalt. There are, of course, exceptions to this rule. Detroit, Norfolk, Akron and Washington, D. C., have used sheet asphalt extensively for resurfacing.

Multiple Courses for Salvaging Old Concrete

Where old portland cement concrete and block type pavements have been given added life with asphalt resurfacing, it appears that multiple courses are definitely desirable. These usually consist of a binder and wearing surface and, in some cases, a light surface treatment precedes placing the plant-mixes. This is good practice, for multiple course resurfacing of badly cracked concrete and block type removes the danger of old cracks being reflected through the new surface. A total thickness of 2 inches for the combined courses appears to be the minimum depth necessary for salvaging these types. Paving engineers who lean somewhat to the ultra-conservative side, use thicknesses somewhat greater than 2 inches for salvaging old rigid surfaces.

Surface Treatments Precede Plant Mixes

The practice of using light surface treatments on old concrete streets prior to placing plant-mixes to reclaim them was commented on as follows:

"In resurfacing old concrete streets with plant-mix types of asphalt mixtures, we first surface-treat the concrete, using road-mix methods, and employ surface thicknesses of approximately 40 to 60 pounds per square yard. These treatments are followed in 30 to 90 days with plant-mix types of adequate thickness. Advantages of using surface treatments lie in the fact that they provide excellent—though inexpensive—binder and desirable leveling courses. They also provide cushions to prevent cracks in the old concrete from being reflected through the final plant-mixes. The cushions likewise prevent excessive impact from being applied to the old concrete through the coarse aggregate used in the plant-mix binder. Surface treatments effectively seal off capillary moisture and reveal weak spots in the old surface so they can be inexpensively replaced before final resurfacing."

Minimum Quantity Tack Coat

For resurfacing concrete and other impervious surfaces with asphalt, a tack coat on the old surface is almost always used. Care should be exercised to keep the paint

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coat to a minimum quantity to prevent an excess of bitumen from coming through the new surface. One-tenth gallon of suitable asphalt per square yard is usually ample. The distributor spray bars should be kept clean to insure uniform application.

Sidewalk Resurfacing

The most unusual example of resurfacing was found in Asheville, N. C. The feature was the economy with which 8 or 10 miles of old, disintegrating two-course portland cement concrete sidewalks were reclaimed from an unsightly and dangerous condition. They were made smooth and attractive at a time when funds were too low to allow complete reconstruction. Engineers ingeniously resorted to resurfacing, and the progressive disintegration was arrested with a cold-laid, sheet grading type of asphaltic mixture.

This report of resurfacing concrete walks is of interest largely because of its novelty. Therefore, it can hardly be regarded as a definite trend. It has, however, been observed that in cities with municipally-owned asphalt plants, there is a definite trend toward the use of asphaltic mixtures for new sidewalk construction.

Airport Paving

The tremendous airport-surfacing program of the past few years, given impetus by large Federal grants of funds, has resulted in a wide variety of asphalt surfacing at municipal airports. The types have ranged from simple surface treatments to stabilize existing surfaces of thin gravel or stone, to the high types commonly used in business areas in metropolitan cities.

It is a significant fact that this program has consisted of more than 90 per cent of bituminous types. Perhaps even greater significance lies in the preponderance of flexible bases used. In not a single instance have replies shown the use of rigid bases under asphalt. This trend toward flexible foundation design has developed with full knowledge on the part of municipal paving authorities that airplanes of tremendous weight are now in the making. Aeronautical and paving authorities are confident that these surfaces and bases of asphaltic concrete or rolled aggregates will adequately serve these giant planes.

One of the most unusual airport surfaces is located in Cleveland. Its novelty lies in its shape. Conventional runways were not used. The asphalt base and wearing surface consists of a huge landing mat approximately 3,000 feet wide and 3,500 feet long, with short appendages at two diagonal corners.

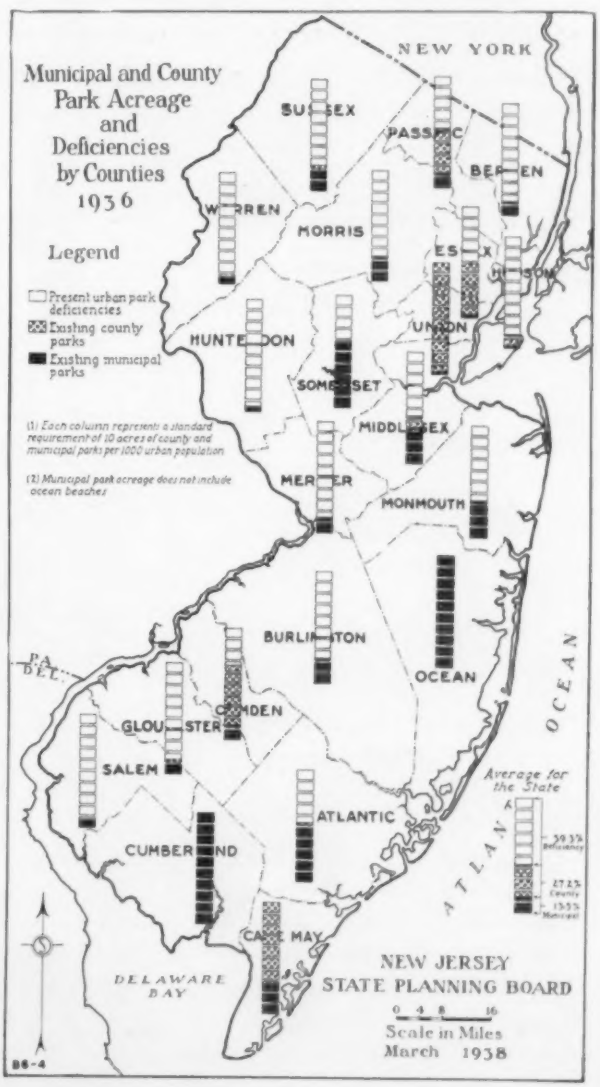
To list all the important airports surfaced with asphalt during the past few years would require a list far too long to be interesting. The sand-asphalt type of base and surface at Charleston, S. C., and the 2¼-inch asphalt surface on a 6-inch gravel base at Memphis, as well as the Salt Lake City and Reno, Nev., airports, are nevertheless worthy of reference. The low-cost 3-inch asphalt surface courses on sand-clay base at Omaha and the oil-aggregate runways at Fort Wayne, Ind., are also interesting examples of municipal asphalt paving.

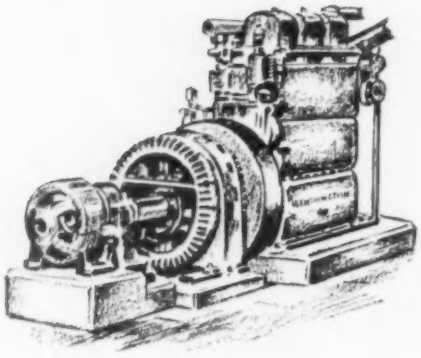
ACKNOWLEDGMENT.—From a paper presented before the Municipal Division at the 1938 Road Show and Convention, Cleveland, Ohio.

Visualizing Shortage of Park Acreage

THE accompanying map, prepared by the New Jersey State Planning Board, shows "Municipal and County Park Acreage, and Deficiencies by Counties," in New Jersey. Following is an abstract of a news release issued by the Board, on August 31, 1938, explaining the need for more urban parks and playgrounds in this state. Subsequent releases make recommendations and suggestions for increasing these recreational opportunities. The widely accepted standard urban park requirement is 10 acres per 1,000 of population. Four counties in New Jersey have exceeded this standard, but the state as a whole suffers a deficiency of 59 per cent, or more than 23,000 acres. Most unfortunately, the greatest lack of park and playground facilities is in some of the state's most densely populated areas.

In each of the four counties where available acreage exceeds the standard, there remains varying deficiency in certain areas by reason of faulty distribution. Moreover, approximately 20 per cent of the urban park and playground acreage in New Jersey is still undeveloped. Bad distribution and unavailable acreage, together with a certain amount of failure to provide the most useful facilities, probably result in an effective acreage of not more than one-third of actual present need.





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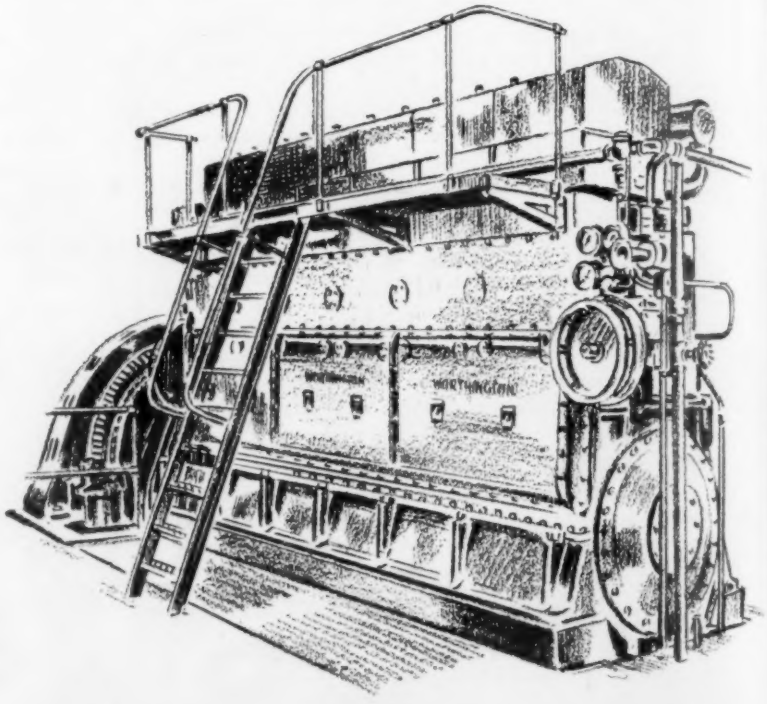

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Forward Steps

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Municipal Officials, Chamber of Commerce Executives, and Others

Regional Association Renders Many Services

CLEVELAND, OHIO.—The Regional Association of Cleveland is a non-partisan citizens' group working toward:

(1) The development of comprehensive regional plans for land use in Cleveland and environs;

(2) The promotion of better housing conditions for the people of Cuyahoga County; and

(3) The exercise of governmental powers in respect of land use and housing conditions.

The Director of the Association is Ernest J. Bohn, member of the Cleveland City Council, Director of the Cleveland Metropolitan Housing Authority, Past President of the National Association of Housing Officials, and a leader in public housing work in this country. The trustees of the Association include prominent industrialists and business men, leaders of labor and social work, and the Chairmen of the Cleveland and Cuyahoga County Planning Commissions. Affiliated with the Association are many neighborhood improvement groups as well as city-wide real estate, architectural and civic groups. Organized in January, 1937, it is supported entirely by contributions from private sources.

The Association works through citizen committees on special subjects, and through its technical staff, headed by John T. Howard, city planner. Its activities comprise both technical and educational work in the fields of city planning and housing, combining the functions often divided among several citizen groups in other cities. With the full support of the press and of other civic organizations, and the whole-hearted cooperation of official agencies of city, county and suburban government, the Association has made rapid strides in coordinating planning effort throughout the region and in taking its place as the recognized clearing-house of information on housing and planning.

Activities of Technical Staff

The technical staff has undertaken a comprehensive regional survey, assisted by a WPA project sponsored by the City Plan Commission, to collect and map data for the whole county dealing with land use, present zoning, transportation and highways, population, publicly owned land, tax-forfeited land, utility lines, etc. This information, supplemented by the reports of the Real Property Inventory of Metropolitan Cleveland, will make the Cleveland region one of the best documented metropolitan areas in the country for planning purposes. On these data a comprehensive regional plan is to be based, prepared under the guidance of expert consultants.

In addition to this long-range planning program, the Association is assisting suburbs and local groups in planning and zoning matters, and advises with public officials upon all major construction projects of regional significance. The staff has materially aided the Cleveland Metropolitan Housing Authority in preparing the background for its public housing program.

One of the first achievements of the Association was the setting up of a regional geodetic survey, under the joint sponsorship of city, county, state and Federal governmental agencies and of universities and public utilities, to provide a uniform system of coordinates and an accurate map of the region. The Association acted as a medium of cooperation, bringing together all the individual agencies which needed but could not afford to execute independently such a survey. This technique is being used as an example in other cities of the country. The survey is operated under the advice as to policy and procedure of the Association's Committee on Official Mapping and Surveys, which comprises representatives of the sponsoring agencies as well as of professional engineering groups.

The Smoke Abatement Committee, representing smoke-making industries and fuel dealers as well as citizens, is working to develop a control ordinance acceptable to all sides which will accomplish its purpose by education and cooperation rather than by coercion.

Housing Center

The Association has established a Housing Center in its own building on the Mall, Cleveland's civic center, which houses its offices as well as those of the Metropolitan Housing Authority and other agencies. Equipped with an extensive technical library and a meeting room, it serves as a clearing-house for activities in planning and housing throughout the region, and a center of education through exhibits, information bureau and speakers' bureau. This Housing Center is the only such building in the country.

The Housing Standards Committee has secured the cooperation of the City Building, Health and Fire Departments in making a thorough survey of substandard dwellings, leading to enforcement of ordinances requiring demolition or rehabilitation.

The Association's educational activities have included work with the public schools in developing curricula, lecture courses and conferences at local universities, and radio broadcasts, in addition to providing speakers for civic organizations and local groups and publishing reports and pamphlets. Through these media an enlightened public opinion is being built up as an essential corollary to the technical work of the Regional Association in bringing about the rebuilding of Greater Cleveland.

JOHN T. HOWARD,
Technical Officer.

Outdoor Reading Rooms in Parks

LOS ANGELES, CALIF.—Free libraries offering use of books and magazines to visitors in Los Angeles parks, are so successful that it is proposed to extend them to all branch libraries adjacent to parks in the city. There are many readers in the open parks and squares who never could be enticed to enter an indoor library. They are repelled by what they believe may be the difficulties to be met in the library routine, or by their own unconventional garb, or by the distance to branch libraries, or by the indoor atmosphere.

The main library in Los Angeles, on the fringe of the downtown business district, is surrounded by a park. Library authorities noticed that, though many used the park, very few had cards that would permit them to take out books and therefore lounged about or gathered in small knots for conversation, or sat and watched the passers-by. So a table was set out, with magazines and books, and these were offered free to any who might care to read them.

The response was gratifying; so much so that a problem which had bothered park officials in Pershing Square, in the center of the downtown business district, a problem of offering some light diversion to the thousands who frequented the square, bade fair to be solved. It has been estimated that close to 100,000 persons on some days frequent or pass through this square, which is shaded by semi-tropical trees and visited by wild birds. So many throng the square that the 2,500 seats provided are insufficient, and groups gather on the broad concrete walks, where they listen to some of the more loquacious solve the problems of the times. A second outdoor library was installed there, in a nook sheltered by banana palms. It proved immediately popular.

Following the installation of the library at Pershing Square, a third was decided on for Lafayette Park, in a residence district near a branch library. The three are cared for by five WPA employees. The magazines and books (about 250 magazines and 150 books at

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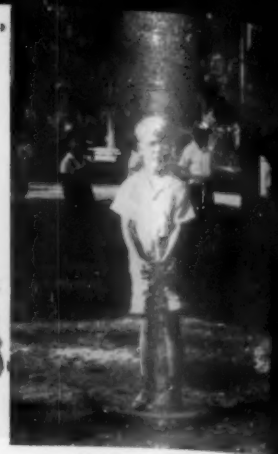
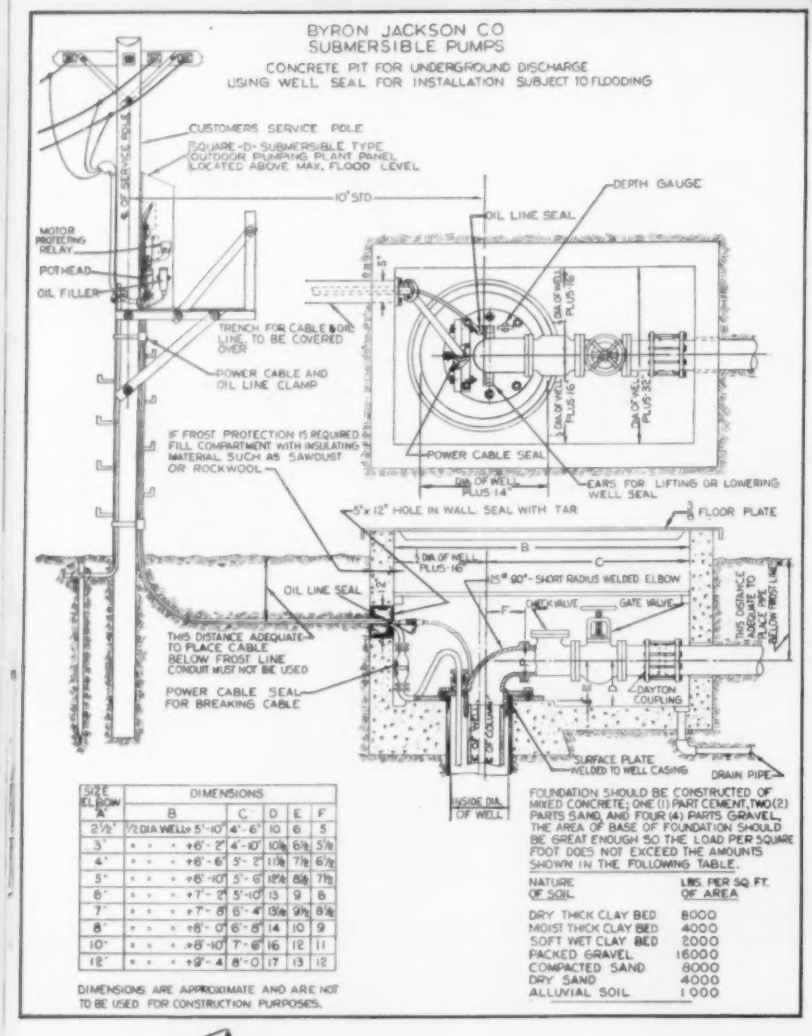


Typical Submersible installation in a city playground.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POWER CABLE SEAL
DIA OF WELL PLUS 14"
EARS FOR LIFTING OR LOWERING WELL SEAL
5"x 12" HOLE IN WALL, SEAL WITH TAR
FLOOR PLATE
DIA OF WELL PLUS 16"
125° 90°- SHORT RADIUS WELDED ELBOW
OIL LINE SEAL
CHECK VALVE
GATE VALVE
THIS DISTANCE ADEQUATE TO PLACE CABLE BELOW FROST LINE CONDUIT MUST NOT BE USED
POWER CABLE SEAL FOR BREAKING CABLE
DAYTON COUPLING
SURFACE PLATE WELDED TO WELL CASING
DRAIN PIPE
INSIDE DIA. OF WELL

SIZE ELBOW A	DIMENSIONS B	C	D	E	F
2½"	½ DIA WELL + 5'-10"	4'-6"	10	6	5
3"	" " " +6'-2"	4'-10"	10½	6½	5⅞
4"	" " " +6'-6"	5'-2"	11⅛	7⅛	6⅛
5"	" " " +6'-10"	5'-6"	12⅛	8⅛	7⅛
6"	" " " +7'-2"	5'-10"	13	9	8
7"	" " " +7'-5"	6'-4"	13⅝	9½	8⅛
8"	" " " +8'-0"	6'-8"	14	10	9
10"	" " " +8'-10"	7'-6"	16	12	11
12"	" " " +9'-4"	8'-0"	17	13	12

DIMENSIONS ARE APPROXIMATE AND ARE NOT TO BE USED FOR CONSTRUCTION PURPOSES.

FOUNDATION SHOULD BE CONSTRUCTED OF MIXED CONCRETE; ONE (1) PART CEMENT, TWO (2) PARTS SAND, AND FOUR (4) PARTS GRAVEL, THE AREA OF BASE OF FOUNDATION SHOULD BE GREAT ENOUGH SO THE LOAD PER SQUARE FOOT DOES NOT EXCEED THE AMOUNTS SHOWN IN THE FOLLOWING TABLE.

NATURE OF SOIL	LBS. PER SQ. FT. OF AREA
DRY THICK CLAY BED	8000
MOIST THICK CLAY BED	4000
SOFT WET CLAY BED	2000
PACKED GRAVEL	16000
COMPACTED SAND	8000
DRY SAND	4000
ALLUVIAL SOIL	1000

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Pershing Square) are wheeled out from a storage place at 9:00 o'clock in the morning, and remain for distribution until 4:00 P.M. The books used are those too worn for regular library use, or duplicates, repaired and covered.

The three libraries, according to statistics kept by the authorities, gave out 56,204 magazines and books the past fiscal year, up to June 1. Of these, about one-twentieth were books. By far the greater number borrowed were in Pershing Square.

There is no "red tape" incident to the borrowing. The borrower simply walks up to the man in charge, selects his book or magazine, and walks away. They are careful of their selections, and almost invariably bring them back before closing time.

Magazines called for are especially those replete with illustrations. Books selected are those which can usually be finished at a reading; or short sketches and the like. Long novels are not much in demand. These open-air libraries are kept in operation throughout the year, except on rainy days.

L. H. SWEETSER.

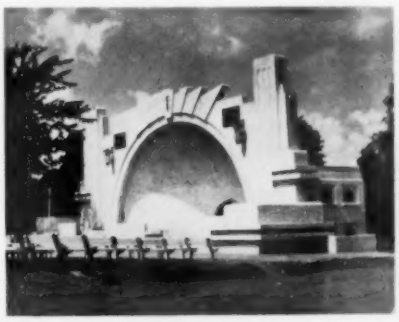
Band-Shell with A-1 Acoustics

FORT SCOTT, KANS.—Because of public demand for an open-air band-shell, the City Commissioners of Fort Scott appropriated funds from a park development bond issue sufficient to construct in their $200,000 Central Park a modern reinforced-concrete band-shell of fine acoustical quality. The shell is 85 feet wide; 38½ feet high, with proscenium arch 25 1/6 feet above stage floor; stage depth, 33 feet.

Nine steps on each side of the shell in front give access to the stage, which is large enough to accommodate a 125-piece orchestra; and entrance is also possible from the rear center. A large dressing room is on each side of the stage, opening into a rear hallway. Below on the ground level are rest rooms accessible to the public.

Ornamental glass and bronze electric fixtures 5 feet high are placed on each side of the façade, with shuttered recesses just above them for loud-speakers.

The design of the structure, finished in rough white portland stucco, is based on band-shells such as the one at Sioux City, Iowa. It was built for $16,000 under a PWA grant which also gave Fort Scott a fine bath-house, a swimming pool and concrete tennis courts, one of the most efficient recreational layouts in Kansas.



A WPA project provided a stone-terraced amphitheater with reinforced-concrete seats for 3,000. The shell is situated in a valley, and heavy winds, varied atmospheric conditions or outside noises have not overcome the acoustical excellence during any program.

FREEMAN D. MARTIN,
Commissioner of Streets and Public Utilities.

Keeping a Village of 10,000 on the Up

GARDEN CITY, N. Y.—The incorporated village of Garden City has a population of 10,160, a property valuation of $52,449,719, or $5,160 per capita, and municipal expenses of $543,802. Real property is taxed by five government units—the State of New York, the County of Nassau, the Town of Hempstead, Union Free School District No. 18, and the Village of Garden City.

Village taxes for 1938 totaled $403,863, or $39.73 per capita on 100 per cent valuation, or $0.77 per $100 of value. The per cent of taxes collected, always high, has risen from a minimum of 90.9 in 1929 to 97 in 1937.

The items in the 1938-39 budget are the following per cent of the total budget: police, 16 per cent; highway maintenance, 12.3; retirement of bonds, 12; garbage, 11.2; fire, 9.7; general government, 8.5; street lighting, 8.5; sewers and treatment plant, 7; parks and playgrounds, 6.3; bond interest, 5; street cleaning, 2.2; building department, 1.3 per cent.

The water department is self-sustaining, and all improvements, including 8,325 feet of trunk mains added during the last year, are financed from revenue.

Nine trucks collected 4,794 tons of garbage, 2,306 tons ashes, 1,752 tons rubbish, 319 tons of brush, of which 5,196 tons were incinerated at a disposal cost of $1.06 per ton. Collections are made from basements daily. Ashes and noncombustible materials are dumped.

As the main service unit of the municipality, the Department of Public Works handles not only water and sanitation, but streets, parks, buildings, engineering and purchasing as well, spending 57 per cent of the budget exclusive of debt service. Current improvements include 73 new street lights, and new traffic signals on Franklin Avenue coordinated with the railroad gates. The Department maintains its 26 trucks and construction plant, and also the fire and police vehicles and school buses. Trucks made 146,532 miles at an operating cost of 3½ cents last year.

The Fire Department has a volunteer force of one chief, two assistant chiefs, three captains, three lieutenants, sixty firemen, and thirteen paid men, including the captain and two lieutenants. There were 255 alarms in 1937 and slight fire loss. Equipment comprises one Brockway chemical, one Plymouth utility truck, and the following American-LaFrance apparatus—two pumpers, two hose trucks with boosters, and one City Service ladder truck.

The Police Department has a chief, four sergeants, and twenty-four patrolmen. The Chevrolet squad car and five Ford and Plymouth patrol cars are equipped with two-way radio, as is also the car of the Superintendent of Public Works. These police cars, with two Indian motorcycles, patrol 52 miles of streets.

The most noteworthy development consists of the seven municipal parking fields completed and dedicated in June, the start of a policy which will meet all future parking needs.

ALLAN H. ROGERS,
Superintendent of Public Works.

FREDERICK, MARYLAND

(Barbara Frietchie's Battleground)

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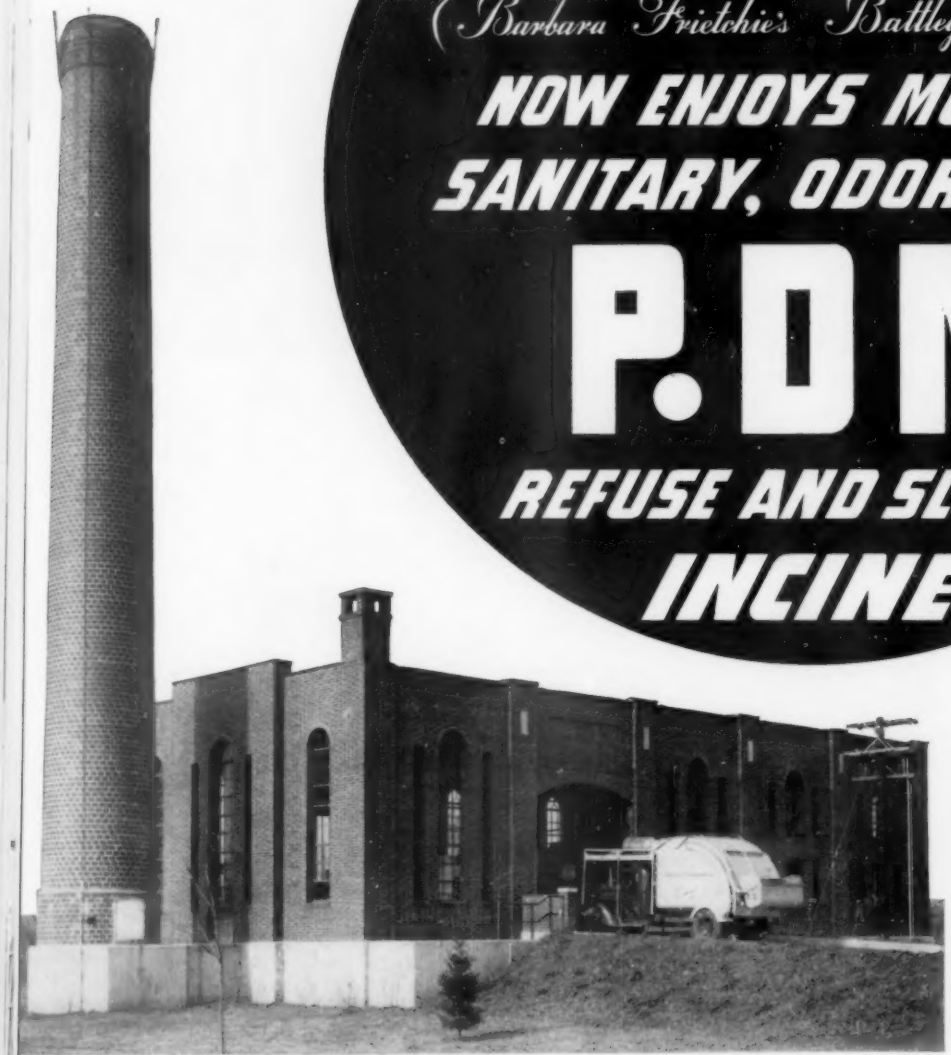

P·D·M ALWAYS ON THE JOB

"The clustered spires of Frederick stand Green-walled by the hills of Maryland..." So sang the poet Whittier of the pretty, spotless little town where Barbara Frietchie encountered a gallant Southerner these many years ago.

Still charming, still spotless is the thriving modern City of Frederick, well-guided by progressive government. Helping to guard the health and attractive surroundings of Frederick's citizens is this new Sewage Disposal-Incinerator Plant in which a PITTSBURGH-DES MOINES HIGH TEMPERATURE REFUSE INCINERATOR destroys all garbage and rubbish collected by the City together with sludge from the sewage disposal plant.

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Low Costs for Big Public Housing Project

A Demonstration Which Will Aid Private Housing

THE extraordinarily favorable estimates which have been received for the Red Hook Housing Project in Brooklyn are gratifying to all who are interested in slum clearance and low-cost housing for New York City. Many things, aside from a favorable buyers' market, no doubt conspired to produce the favorable figures obtained. Alfred Rheinstein, Chairman of the Housing Authority, and his assistant, Allen F. Harrison, are practical builders and engineers. The Red Hook Associated Architects who designed this, to date, the largest New York City housing project, received their appointment as a result of a city-wide architectural competition instituted about four years ago by the Housing Authority. This group, headed by Alfred Easton Poor, included William F. Dominick, William I. Hohauser, Electus D. Litchfield, W. T. McCarthy, Jacob Moscowitz and Edwin J. Robin. Among others associated with the project are Gibbs & Hill, structural engineers; Frank Sutton, mechanical engineer; and Charles N. Lowrie, landscape architect. The contract for the superstructure of this housing development has been awarded to the George A. Fuller Construction Co.

Commenting on the amazingly low costs which establish "a shining landmark in low-rental housing in this country," in an editorial headed "A Victory for Housing," *The New York Times* said on September 16:

"It was not expected that the net outlay for each room (excluding what the Wagner-Steagall Act describes as 'land, demolition and non-dwelling facilities') could be brought much under the $1,250 limit set by the Federal law. Actually, Red Hook will require an expenditure of only $850 a room for construction alone, only $1,125 if all expenses are included. The total expenditures will be about $12,000,000 instead of the previously estimated $16,400,000. If the saving is applied to additional buildings, 31,000 persons can be housed instead of the previously expected 22,000.

"Commissioner Rheinstein and his colleagues have taken this great step forward by applying principles of economical construction which some private builders have been painfully learning during the past few years. Curtained alcoves instead of closets, soft-wood floors covered with linoleum instead of hardwood and similar devices have saved money without lowering essential standards. The new houses will be healthful, convenient and attractive. They are to be provided with elevators, bathrooms, electric refrigerators, gas ranges, clothes dryers and kitchen cabinets. They will occupy less than one-quarter of the ground space allotted to them. They will be light and airy, with ample room for courts and gardens.

"They do not solve the problem of non-subsidized low-cost housing. Unless unlooked-for economies can be introduced into their management they may cost as much as $8 a room a month to maintain, whereas the rents charged will not exceed $6 a room. But the margin has been whittled down. If the Housing Authority can provide these accommodations at this cost for people of small incomes, private builders may soon be able to meet the needs of the vast group which can pay from $8 to $10 a month but is not yet adequately provided for. In other words, this demonstration in public housing may be expected to help, not hurt, private housing. It should certainly give the limited-dividend corporation a new lease on life.

"If these estimates are sustained in actual construction and operation, as one is sure they will be, the friends of decent housing can ring bells and blow whistles. America will be on the direct road to wiping out its urban and rural slums."

"Equivalent Elimination" and New Housing Projects

THE so-called "equivalent elimination" requirement of the United States Housing Act has not yet prevented any locality from proceeding with a housing project, it was announced on September 22 by Nathan Straus, Administrator of the United States Housing Authority:

"The Act under which the Authority is operating provides that it shall enter into no contract guaranteeing any annual contributions in connection with the development of a low-rent housing project unless the project 'includes the elimination by demolition, condemnation, and effective closing, or the compulsory repair or improvement of unsafe or insanitary dwellings situated in the locality or metropolitan area, substantially equal in number to the number of newly constructed dwellings provided by the project.' The Act also permits the deferment of this closing or repair of substandard dwellings upon a showing of acute shortage.

"The equivalent elimination provision of the law is automatically complied with when a new housing project includes the elimination on the same site of unsafe and insanitary dwellings substantially equal in number to the number of new dwellings constructed. However, because of the relatively high cost of property in densely populated sections of metropolitan areas, many of the low-rent housing projects are constructed on vacant sites or on sites occupied by few unsafe or insanitary dwellings. In such cases, arrangements are made by the local authority to provide for the equivalent elimination of unsafe or insanitary dwellings elsewhere in the city.

"The required elimination usually is accomplished by the closing-up of unfit dwellings through the exercise of police power of the health department or the building department of the city. This obligation of the city is reduced to a definite contract that a certain number of slum dwellings will be so closed or demolished within a given period after the completion of the housing project."

Lake-Front Improvement, New Orleans

THE results of the work that has been done to improve the shore of Lake Ponchartrain are made impressive by the accompanying contrasting pictures. (See THE AMERICAN CITY, November, 1937, page 101, for a description of the work then in progress.)

The improvement extends for five miles along the shore and includes 2,000 acres of man-made land. Most of this new land is being divided into lots and will be sold by the New Orleans Levee Board to persons who agree to erect homes or other buildings on them within three years. To prevent speculation, only one lot will be sold to a family.

NORTHERN BOUNDARY OF NEW ORLEANS ALONG LAKE PONCHARTRAIN IN 1927

Photographs by courtesy of New Orleans Association of Commerce

THE SHORE OF LAKE PONCHARTRAIN TODAY

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Traffic Control and Facilitation

Conducted by Publications Committee, Institute of Traffic Engineers, 1 Park Ave., New York

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Preventing City Traffic Accidents

By FRANK J. McDEVITT

Director of Streets and Sewers, St. Louis, Mo.

AMONG the various factors entering into the transit problem, the subject of traffic-accident prevention is of prime importance. The economic loss in the United States in recent years from traffic fatalities, injuries, and property damage has amounted to several billion dollars. This does not include the untold misery and abject suffering of many thousands of victims and their families, which can not be measured in dollars.

The records for the first eight months of this year indicate an awakened public consciousness, and as a result 1938 will likely show for the first time a decided improvement.

When the present city administration took charge in the spring of 1933, traffic conditions were in a deplorable state. This year St. Louis ranks second in the National Safety Council rating. A few words on what was done to achieve these results may furnish some helpful suggestions to other cities, and encourage them to do likewise.

No city can successfully cope with this situation unless there is active and sustained support on the part of the chief executive, and St. Louis is indeed fortunate in having such a man at the helm. Early in the year following his inauguration, Mayor Dickmann of St. Louis and Governor Ely of Massachusetts were invited to address the National Highway Safety Conference in Washington. The former presented a report, which had been prepared for the first time, giving a detailed account of St. Louis traffic accidents, their causes, and suggestions for betterment. Owing to the favorable reception of this report, similar reports have been made up each year since that time. The factual data used in the compilation are obtained from the daily records of all traffic accidents. These reports have been very helpful, especially to the Mayor's Traffic Commission, an unofficial body, composed of court judges, prosecuting officials, Police Department, Automobile Club, Safety Council, Public Service Company, Department of Streets and Sewers, Board of Aldermen, automobile dealers, and every one else connected with traffic problems. Notwithstanding these efforts, traffic conditions grew worse in 1934; they remained stationary in 1935, but showed a gradual improvement in 1936 and 1937. The improvement to date in 1938 is very pronounced. Fatalities are down 42 per cent. Accidents and injuries are down 20 per cent.

However, one must bear in mind that "Rome wasn't built in a day." Milwaukee, which for some time has been our safest city, achieved this enviable record through years of painstaking effort in advance of similar effort by other large cities. If we are to reduce accidents and properly regulate traffic, it will require careful planning and constant attention, with complete cooperation on the part of all agencies concerned.

Mayor Dickmann has played a leading part in the promotion of traffic safety. His interest and support have been a source of encouragement to the courts, the prosecuting officials, and the Police Department. Political intercession in traffic cases is largely a thing of the past. Especially noteworthy was the 30-mile-per-hour campaign against speeders. The numerals "30" which in newspaper parlance mean "That all," were prominently displayed all over the city. As a result, motorists became impressed with the legal rate of speed, and there was a noticeable slowing-down of all traffic.*

Every day the issues of St. Louis newspapers carry on the front page fines and workhouse sentences imposed by the Police Court Judges on motorists. Many appeal their cases, and a jury composed largely of motorists either eliminates the workhouse sentence and modifies the fine or acquits. These appeals, resulting in modification or acquittal, are not news and usually receive a few lines on the last page where they are not noticed. The psychology of the front-page articles concerning fines and workhouse sentences serves to instill a wholesome fear in all motorists. The Police Department and the Police Courts may by their vigorous enforcement be entitled to a large share of the credit for the showing made to date.

The Department of Streets and Sewers has charge of traffic regulations, all reg-

* THE AMERICAN CITY, December, 1936, page 51.

(Continued on page 99)

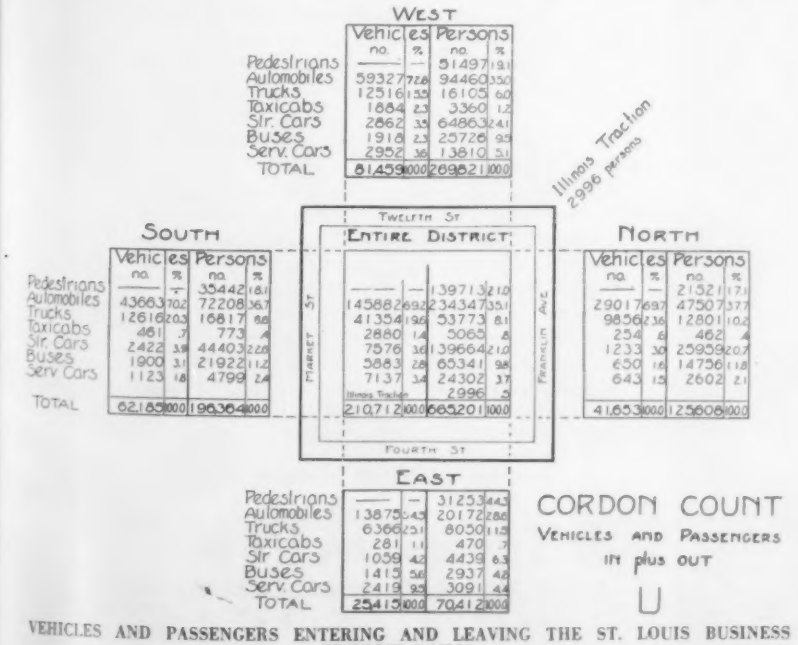
PERSONS INTO THE DOWNTOWN AREA

	Street Cars	Buses	Service Cars	Total	Autos[1]	Grand Total
1916*	149,171	.....	.....	149,171	30,666	179,837
1926*	157,768	17,616	.....	175,384	96,953	272,337
1930*	114,524	15,277	.....	129,801	103,334	233,135
1937	70,155	30,968	13,227	114,350	119,479	233,829

* From a report in 1930.

AUTO AND TRUCK REGISTRATION

1917—27,269 1927—147,441 1936—187,260



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STREAMLINE Copper Pipe cannot rust and since it is not connected by threading, the wall need not be so heavy. Pipe which is threaded to connect must have a much heavier wall because the thread diminishes its thickness and the strength of the pipe is therefore limited to this diminished wall thickness, while on the balance of the pipe expensive surplus material remains, but gives no extra service for its additional weight and consequent cost.

STREAMLINE Copper Pipe utilizes only that wall thickness required for actual service and the fitting actually reinforces the connection, making it the strongest point, while with threaded pipe it is the weakest.

A STREAMLINE service line is vibration proof. Settlement of filled earth or water mains, etc. does not affect it. STREAMLINE Fittings and Copper Pipe are the ideal materials for water works use; for many applications in filtration plants; in aeration lines and in heating coils using the sludge digestion system in sewage disposal plants—and for all general plumbing and heating purposes.

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ulatory devices, the local Drivers' License Bureau, engineering supervision and inspections. The Traffic Section has performed some outstanding work, such as machine-painting center lines with three parallel lines instead of one solid line, thus saving 25 per cent in paint. Formerly, electric signals were installed, maintained and operated by the Police Department and the Department of Public Utilities. These functions are now performed by the Traffic Section, thereby furnishing greatly improved service through radio-equipped trucks. A force of 20 specially trained traffic-regulation inspectors is available at all times for investigations, traffic counts, and similar duties.

All standard traffic and street signs are manufactured in a modern paint shop at greatly reduced prices. Electric signals are checked weekly to see that the changes conform with a progressive traffic movement harmonizing with a speed of 30 miles per hour. All traffic and street signs are cleansed at regular intervals. Locations with a high accident frequency are carefully investigated, and study drawings are prepared showing vehicular and pedestrian counts, approach speeds, obstructions, and other pertinent data from which conclusions for betterment can be drawn.

The local St. Louis Drivers' License Ordinance has many good points not contained in the Missouri State Law. All applicants must sign and present application in person. Licenses are mailed with instructions to the postal authorities not to deliver unless the postman knows the applicant resides at the designated address. The application and a duplicate of the license are filed numerically and alphabetically, and a complete record of convictions is noted on the reverse side. The filing is exceptionally accurate and has been used repeatedly by the Police Department and Federal agencies in apprehending criminals.

Accidents involving alcoholism have shown a 60 per cent reduction in the past four years. This may be attributed partly to workhouse sentences, also to the revocation of the City Drivers' License which is mandatory on the courts upon conviction for this type of violation. Motorists are at last beginning to realize that alcohol and gasoline don't mix. If you must drink, don't drive. Use a taxicab instead.

Accidents involving "hit and run" drivers are the most despicable of all, and no punishment imposed by the courts can be too severe. If this evil is to be stamped out, workhouse sentences, upon conviction, should be mandatory.

Left-hand turns are one of the major causes of traffic accidents due to the conflict with pedestrians. St. Louis uses a white light immediately preceding the green for this movement, but pedestrians will not wait for the latter. No additional left-hand turns have been installed in recent years, and those existing should be removed wherever possible. In addition to the pedestrian hazard, they cause congestion during the morning and evening peaks by appropriating the inside traffic lane.

Nothing is of more importance than safeguarding the school children. St. Louis enjoys a wonderful record in this respect: there have been 300,000,000 school-child street crossings in each of the past five years without a single accident. Of prime importance in accomplishing these results is the use of swivel-type stop signs affording children protection at all street intersections in the neighborhood of schools. These signs are in use only during the periods when children are on their way to and from school; at all other times the signs are turned with face parallel to curb. Motorists are obliged to stop, and the ordinance is rigidly enforced. Other safety measures consist of well-painted crosswalks and schoolboy patrols supervising the children crossing at designated intersections. Unfortunately, there has been an increase in fatalities and accidents to children under sixteen during the summer vacation. Many of these accidents could have been avoided if parents would prevent playing in the streets.

Pedestrians, who outnumber the motorists four to one, comprise, as usual, most of the fatalities—at least 70 to 75 per cent. Sixty per cent of the pedestrians are over 50 years of age and 75 per cent are males. At least 40 per cent of all traffic accidents took place between intersections and could have been avoided had the pedestrian crossed at street intersections as required by ordinance. That night driving is more hazardous, especially during inclement weather, may be gleaned from the fact that 62 per cent of the fatalities occurred at night. The age of drivers involved in accidents shows a maximum of 15 per cent between the ages of 20 and 35.

Records of the Drivers' License Bureau show that the vast majority of motorists are careful drivers, and are seldom, if ever, involved in accidents. Efforts should be concentrated on about 15 per cent of the registration, and not more than 2 per cent may be classed as habitually careless. A printed list of the latter having three or more convictions during the past two years has been compiled, and distributed to the Police Department, the courts, and prosecuting officials, to serve as a guidance in traffic cases. This list contains about 4,000 names arranged alphabetically.

During 1937 there were 80 accidents, 53 injuries, and 1 fatality due to automobiles striking concrete cones. These cones are used as traffic dividers on wide thoroughfares and at safety zones where there are car stops. These accidents have been over-emphasized by the press, and during the past five years have not exceeded 1½ per cent of the total. Police reports indicate that many such accidents are due either to drinking or falling asleep at the wheel. Unless some substantial form of protection is used, drunken or sleepy motorists can easily kill or maim a number of pedestrians standing in safety zones awaiting street cars. Because of the feeling against cones, this Department has been using cast-iron mushroom buttons for the past several years. The buttons are working out satisfactorily, but complaints continue to come in from pedestrians, who are largely street-car users, demanding more adequate protection at car stops. There are three jinx cones where most of the serious accidents have occurred. These have received special treatment in the way of painting and lighting, and for the first eight months of this year there have been no accidents. With improved visibility, we may yet sell the city on the use of additional cones.

Four Big Toll-Bridges

BALTIMORE may soon join New York, Boston and San Francisco in being one of the important seaport cities in this country to take highway traffic across its harbor over a bridge or through a tube.

The Maryland State Roads Commission has recently announced a $30,000,000 crossing plan of vital importance to local and interstate traffic, in a pamphlet entitled "Maryland's Primary Bridge Program." Four structures are proposed over (1) the Susquehanna River near Havre de Grace, (2) Baltimore Harbor, (3) the Potomac River at Newburgh, and (4) Chesapeake Bay either from Baltimore or near Annapolis.

The crossings as a group form a basis for a fine trunk-line highway system, and make possible the development of a modern state-wide highway plan that is needed greatly.

Since there is insufficient money available to finance both the road and the bridge-building program from current motor-vehicle revenue, the idea of building the crossing structures from revenue bonds, serviced from tolls, was considered and found feasible. When the bonds have been paid off, the structures will be free. Thus, the public can get the benefit of these facilities within a comparatively short time; whereas, if they had to be built out of current motor-vehicle revenue, it would be many years before construction could be undertaken, if ever. The plan also has the advantage of having the persons directly benefited pay for the facilities, rather than putting the burden of financing these very expensive structures on the general public.

To make procedures of this kind possible, the Maryland Legislature, two years ago, passed a toll-bridge act empowering the Maryland State Roads Commission to finance bridges or tunnels by means of revenue bonds payable out of tolls;—providing the cost of each such structure exceeded $750,000, and providing competent engineering and traffic studies showed that the entire cost could be liquidated by tolls and by any special grants which might be made available.

(*Continued on page* 101)

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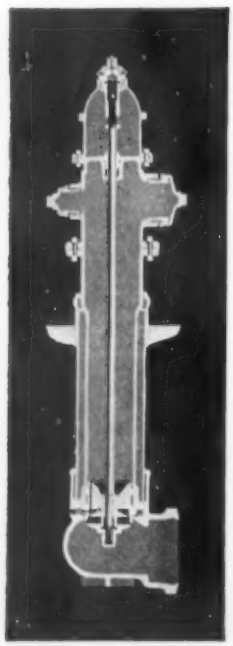

● Install a Mathews Hydrant and you can forget about breaking pavements or digging in the future. Like spark plugs, Mathews barrels are interchangeable. The whole barrel, including all working parts, can be unscrewed, lifted out through the protection case, and replaced from above ground in less than 15 minutes.

Accidents which break the barrel never seriously interrupt Mathews service. The broken barrel can be replaced quickly and economically without digging.

Change of street grade reveals another economy to the Mathews user. The protection case can be cut off or added to, and a barrel of the proper length inserted—without digging.

Modernization is a simple matter. New Mathews barrels with steamer nozzles, revolving heads, and shield operating nuts can be installed practically for the cost of materials—without digging. . . . Specify Mathews.

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THE DOTTED LINES ARE FOUR TOLL-BRIDGES PLANNED TO FACILITATE TRAFFIC IN MARYLAND

Because each crossing is to a considerable extent dependent on the others for traffic, the group is being considered as a single traffic and financial unit. Application for a 45 per cent PWA grant has been made and tentative approval has been indicated.

Plans, and estimates of cost, traffic and revenue are proceeding rapidly. Estimates of traffic and revenue from tolls are being made by Coverdale and Colpitts, consulting engineers, of New York, who have done a great deal of this kind of work for a good many years all over the United States. The designs and estimates of cost are being prepared by the J. E. Greiner Co. of Baltimore, bridge engineers of many well-known structures.

The Baltimore Harbor crossing is of particular interest because it will provide a solution for three very troublesome traffic problems much better than any other proposal yet advanced. At present the north-and-south through highway traffic has to wind its way over narrow and congested streets through the city of Baltimore. The structure, with the excellent approaches which are planned to connect the highways on each side of the harbor, will by-pass the city.

On each side of Baltimore Harbor are industrial developments, beaches, recreational areas and residential districts. Traffic between these areas now follows a circuitous and very congested route around the head of the harbor. The proposed crossing will be a short-cut.

On Sundays and holidays the volume of traffic returning to Baltimore from beaches, situated along the Chesapeake Bay as far south as Annapolis, is so great that cars stand in a line miles long and take hours to make a trip that ordinarily is only a matter of minutes. The harbor crossing will tap this incoming traffic stream at a point where those destined for points on the other side of the harbor may use the crossing and save a great deal of time and annoyance. To a lesser degree the same condition prevails during the evening rush hour on week-days, and the crossing will likewise be a boon to this traffic.

It is planned to start construction by January 1, 1939, and to complete the work by July 1, 1940.

Signal Psychology Over Here

To the Editor of THE AMERICAN CITY:

We read with interest your description last month of the Stockholm method of color sequence now adopted for all Sweden. It is said over there that many rear-end collisions occur due to the fact that drivers interpret the yellow light as a STOP signal; and, therefore, the authorities show the green *with* the yellow. In this country the yellow is completely ignored when shown with green, and vehicles tend to continue through the intersection at normal or increased speed until the green disappears. It has even been found difficult to prevent them from running through when the yellow shows alone. In fact, we are beginning to feel the necessity for an all-red period following the warning in order to provide ample clearance in view of the laxity of obedience.

It has never been necessary for us to indicate to stopped traffic that they should get ready to move. There are very few intersections, at which traffic signals are installed, where it is entirely impossible for the driver of the stopped vehicle to see the amber warning signal come on for the *moving* traffic, and it is the general habit of most people to watch the signal of the moving traffic rather than their own until such time as they see the amber come on for the moving traffic, at which time their attention turns to their own signal and they are prepared to move as soon as the green shows; in other words, we are in the unfortunate position of having a large majority of our drivers impatient and "champing at the bit." We frankly are of the opinion that nothing short of continued rigid enforcement, along with an educational drive, can be expected to correct this situation.

We have this year installed some four or five controls, operating as per the "Challier" method, in Essex County, New Jersey. At first this method of operation caused some confusion due to the stopped driver's habit of watching the signal indication for the moving traffic, but after a while it has become generally accepted at these intersections and is really doing yeoman service. The intersections at which these controls are located are what we normally call the "off set type," which involves a rather wide intersection with a long clearance period necessary. The result is that it becomes possible to set the amber at a uniform time for all traffic signals and that these wide intersections provide the extra clearance by means of an all-red period.

IRVING J. MACK,
Manager, Electric Signal Division,
Signal Service Corporation, Elizabeth, N. J.

More Than 50 Cities Installed Parking Meters in Last Three Years

MORE than 50 cities ranging in size from 7,600 to 400,000 have installed parking meters during the last three years in an attempt to solve their downtown parking problems and to relieve traffic congestion, says the American Municipal Association. Nine cities installed meters in 1937, and several others, including Portland, Ore., have completed installations this year.

Fatal Traffic Accidents Cut 34 Per Cent in Cities with Accident-Prevention Bureaus

REDUCTION of fatal traffic accidents averaging 34 per cent in 17 cities during the last year, following the installation of accident-prevention bureaus, is reported by the International Association of Chiefs of Police. These seven cities showed a reduction of more than 50 per cent in fatal traffic accidents, as follows: Evanston, Ill., 100%; Saginaw, Mich., 63%; Louisville, Ky., 58%; Columbus, Ohio, 54%; Detroit, Mich., 52%; Bridgeport, Conn., 50%; and Greenwich, Conn., 50%. Accident prevention bureaus have been installed also in Syracuse, N. Y.; New Haven, Conn.; Cincinnati, Ohio; Hartford, Conn.; Miami, Fla.; Atlanta, Ga.; Oakland, Calif.; Waterbury, Conn.; South Bend, Ind.; and Chattanooga, Tenn. Installations have been started in Cleveland, Ohio, and the Indiana State Police Department. Surveys preliminary to the installation of accident-prevention bureaus have been completed in Los Angeles and Long Beach, Calif., and Memphis, Tenn.

The Municipal Bond Market

Recent sales of new issues from the September numbers of *The Bond Buyer:*

Amount	Borrower and Purpose	Rate (%)	Term (Years)	Basis (%)
$200,000	Cambridge, Mass., Street Loan	1	1-5 Ser.	.94
183,000	Lexington, Mass., Sewer and Drainage	1.5	7.85 Avg.	1.46
120,000	Wilmington, Del., City Crematory	1.5	1-10 Ser.	1.47
127,000	Centre County Institution District, Pa., Building	2.25	4.75 Avg.	2.01
425,000	Galesburg, Ill., School Building	2.25	12.25 Avg.	2.04
500,000	Reading, Pa., Improvement	2.25	1-20 Ser.	2.37
1,580,000	Lorain Co., Ohio, Bridge	2.5	14 Avg.	2.4
125,000	Lakewood, N. Y., Sewer	2.60	14.66 Avg.	2.55
110,000	Grand Junction, Colo., Sewage Disposal Plant	2.6	9.75 Avg.	2.57
208,000	Natrona Co., Wyo., Memorial Hospital	2.75	10.25 Avg.	2.709
138,000	Clarksville, Tenn., Electric Plant General Obligation	3	9.5 Avg.	2.73
280,000	Jacksonville, Ill., Water Revenue	3.25	13.75 Avg.	2.79
1,000,000	Seattle, Wash., City Light	4.25	5-20.5, O.-A.	4.74

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1 Head Loss Prevented.

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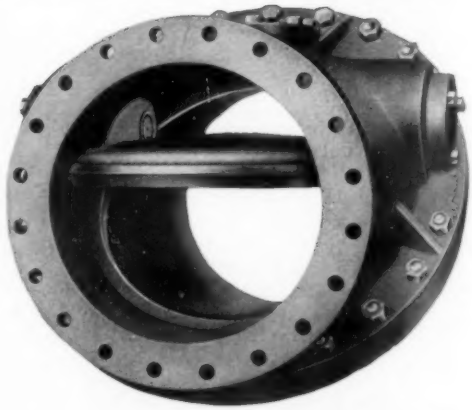
Where there's no noise, there's no wear . . . **nothing but efficient, dependable operation** . . . month after month, year after year. Those are the working habits of Chapman's Non-Slam Check Valve.

This valve has only one moving part . . . a balanced, hinge-pinned disc that rides steadily in the flow when the valve is open . . . **that can't slam when the valve closes because the short flap goes against the stream.** And that means there's no vibration or water-hammer to open up the flange-joints, set up a surge, or strain the line. It means that there's no wear within the valve itself.

Chapman's Non-Slam Check Valves give you this 5-point surety of long-term savings on any service. Get full details and prices. WRITE.



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When you write for that catalog, kindly mention THE AMERICAN CITY.

Improving Municipal Administration

Current Items from the Public Administration Clearing House

Increasing Dependence on Non-Property Revenues

OTHER revenue channels are gaining upon the property tax as a source of municipal revenue, the Federation of Tax Administrators said on August 27. The upward trend of three decades was culminated in 1936, when latest available figures show non-property revenues reached 41 per cent of total revenue receipts in the 94 American cities of more than 100,000 population. A 30-year spread of municipal revenue shows that the general property tax totaled $256,000,000 in 1906 (80%) and $1,726,054,000 in 1936 (59%). All other revenue in 1906 totaled $61,007,000 (20%) and $1,165,068,000 in 1936 (41%).

Prominent in revenue sources gaining upon the property tax are municipal charges and fees. Although not formally "tax" receipts, these are levied upon a sufficient number of taxpayers to deserve consideration in any compilation of municipal revenues. Among other municipal revenue sources are: poll taxes; license fees, including liquor and others; special assessments; fines, forfeits and escheats; subventions and grants; donations; pension assessments; highway privileges; rents and interest; earnings of general departments; and earnings out of public service enterprises.

Constantly expanding real estate valuations and rising tax rates, spurred by the speculative boom of the 1920's, brought property tax collections in 1931 to an all-time high of more than $2,500,000,000, or 67 per cent of total revenue receipts. A high percentage of receipts was shown in 1921, when property tax collections accounted for 74 per cent of the total, but collections that year were slightly less than half those a decade later.

Municipal revenue reflected the staggering impact of the depression upon the real estate tax and the general decline of property values. The United States Bureau of Census figures show that, although rising to 69 per cent of total revenue receipts, property tax collections in 1932 declined by over $500,000,000. Non-property revenues fell by about $225,000,000 to 31 per cent of total receipts, the lowest percentage in more than a decade. Unlike the property tax, however, which continued to decline sharply in the remaining years of the slump, these sources demonstrated a steady rise.

Faced with the need of continuing vital government services, cities set various devices to encourage payment of due taxes —installment collections, discounts, postponement of collection dates, cancellation of penalties; then turned increasingly to the states and Federal Government for aid. Distribution of state-collected taxes among the cities, adopted almost universally by 1936, accounted in part for the increase in non-property tax revenues which rose in the three succeeding years, as the property tax returns declined from 69 per cent to 61 per cent of the total revenues. Federal aid to cities grew to almost one-fourth of all revenue receipts for cities of all sizes by 1936, and accounted in part for the gain in non-property revenues. Sharp gains were also registered in subventions and grants received directly from states and counties and in license taxes.

Charges and Facilities for Off-Street Parking

IN American cities of over 25,000 population, charges for parking automobiles in municipally or privately owned parking lots range from 5 cents to 35 cents for an hour or less. For cities of over 100,000 the average is 15 to 20 cents, and in the smaller cities about 10 cents. The average charge for parking three hours ranges from 10 cents to 75 cents in cities over 100,000; 10 cents to 50 cents in cities less than 100,000.

These figures are disclosed in advance data released on August 22 in a joint study of the American Society of Planning Officials and the International City Managers' Association, from which the following information is also taken: The growing traffic crush on the downtown streets of American cities leads to a distinct municipal trend to use undeveloped or vacant land near central business districts for off-street parking. Many cities have attempted to alleviate the problem by setting up municipally owned or operated parking lots; others by seeking to stimulate privately owned parking lots. Cities encourage private operation of parking space by: leasing city land to private interests; enforcement of time limits and parking prohibition regulations in congested areas; changes in zoning regulations on land used in certain areas, and in the use of buildings as parking garages; encouraging property owners to demolish obsolete buildings or causing such buildings to be removed by city agencies.

This study shows that virtually all cities of more than 25,000 population have one or more privately owned or operated parking lots in the central business district. Los Angeles probably has the largest off-street parking facilities, with 652 parking lots and garages accommodating 56,000 automobiles. Detroit is second with 280 parking lots providing off-street space for 22,765 cars; Rochester has 210 parking lots for 15,218 cars; Minneapolis, 100 parking lots for 9,000 cars; Boston, 159 parking lots for 7,500 cars; Cincinnati, 53 lots for 5,274 cars; Dayton, 35 lots for 3,460 cars; and Louisville, 53 lots for 4,331 cars.

A study of 23 cities between 100,000 and 200,000 shows that parking lots range from three in Fall River, Mass., to 125 in Hartford, Conn., and Nashville, Tenn., with 5 other cities having more than 50 parking lots in the downtown sections.

Durham Cab Operators Insured under New Plan

TAXICAB riders in Durham, N. C., under a recent ordinance, are guaranteed property and personal damage insurance, with cab operators required by the city to maintain their own claim fund, reports the International City Managers' Association. Instead of furnishing liability insurance or surety bonds, operators of cabs pay $10 per month per vehicle into their special "association" treasury. This practice will continue until a minimum fund of $20,000 has accumulated, which must be constantly maintained to pay claims.

The limits of damages which cab companies may pay from the fund under the ordinance are $2,500 for injuries to one person in one accident, $5,000 for injuries to more than one person, and $500 for property damages.

The Durham ordinance prescribes the methods whereby cab companies may become members of the association, regulates the scale of fees, and gives the City Council control without involving the city itself in the insurance business.

75 Cities Adopt Uniform Methods of Determining Drunkenness

MORE than 75 municipal police departments are using uniform motor-vehicle intoxication reports to determine proof of drunken driving, as reported by the International Association of Chiefs of Police. A feature of the report forms, approved by the I.A.C.P., is the collection of evidence that the alleged drunken driver's physical condition or judgment was impaired by the influence of alcohol. The reporting system rules out pathological conditions that produce symptoms similar to alcoholic intoxication, by such questions as: "Are you ill?" "Are you under a doctor's care?" "Are you taking medicine?" "How much sleep did you have?" On the reverse side of the forms are recorded results of widely used chemical tests such as blood and breath analyses.

Among cities that have adopted the uniform report forms are Detroit, Mich.; Kansas City, Mo.; Pittsburgh, Pa.; Oakland, Calif.; Buffalo and Syracuse, N. Y.; and Houston, Texas.

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Prepared by
FRANK B. WILLIAMS
Author of "The Law of City Planning and Zoning"

Zoning and Planning Notes

With the cooperation of
EDWARD M. BASSETT
Author of "Zoning" and of "The Master Plan"

Zoning Ordinance—Permit—Delay Pending Change

NEW YORK.—*Dubow v. Ross*, Supreme Court, Nassau County, reported in *New York Law Journal, July* 15, 1938, *p.* 137.—On November 10, 1937, the petitioner applied for a permit to conduct an automobile wrecking business on his premises; and on November 18, 1937, duly filed an application blank. His property was situated in an industrial zoning district, and at that time there was no restriction against such a business in that district.

On November 26, 1937, the Police Commissioner approved the application, and nothing further remained to be done but to issue the permit; but the village officials refused to issue the permit because they thought it against the best interests of the village to have an automobile wrecking business at that place, and had prepared an amendment to the zoning law which would prohibit such business but could not be legally adopted until December 6, 1937.

And the Court holds that the action of the village officials in withholding the permit was in excess of their authority.

EDITOR'S NOTE.—See on this subject Bassett, *Zoning*, p. 110, and cases there cited.

Billboards—Esthetics

NEW YORK.—*People v. Sterling*, 168 Misc. Rep. 365 (Supreme Court, July 20, 1938).—This is an action for penalties under the State Conservation Law, which prohibits the erection and maintenance of certain signs and advertising structures in the Adirondack Park area, considerable portions of which have not been acquired by the state, but are still in private ownership and use. The decision is the denial of a preliminary motion of plaintiff; leaving the law and the facts of the case to be determined later. In its opinion, however, the Court takes this occasion to give a dictum which is of interest in spite of the fact that it is not binding upon other courts. That dictum is as follows:

"Much has been written regarding the sufficiency of purely esthetic purposes as a basis for the extension of police powers by municipalities under legislative authority. Here the municipality is the state itself. No case in this jurisdiction has been brought to my attention which goes so far as to decide that esthetic considerations, alone, are sufficient. It may become a question whether the purposes announced bear some reasonable relation to the objects which have been recognized as within the accepted limits of police powers."

Public Housing—Slum Clearance

NORTH CAROLINA.—*Wells v. Housing Authority of North Carolina*, 197 S. E. 693 (Supreme Court, June 15, 1938.)—The state statute authorizing the mayor of the city of Wilmington to appoint members to a city housing authority for the rehabilitation of congested city areas through the construction, ownership and rental of dwellings is not a delegation of authority contrary to the state constitution. The statute was for a public purpose. The corporation is a municipal corporation. It may incur indebtedness and pledge its faith for necessary expenses, under North Carolina law, without a vote of the people. The statute is not contrary to the state constitution as a special act creating a private corporation. The property acquired by it for the above purposes is exempt from state, county and municipal taxation, since it is held for a public purpose. The city in which it is created may convey property to it without monetary consideration, since the benefit received by the city supplies the want of such consideration. The city is not liable for the payment of obligations incurred by the city housing authority for the purposes for which it was created. But those living in these areas may serve on juries in the state courts, vote in elections held under state law, and otherwise exercise the rights of citizens of the state; and civil and criminal processes of the state enabling them so to do will run.

EDITOR'S NOTE.—With relation to housing as a public purpose, see our Notes for August, 1937.

Public Housing—Slum Clearance—Eminent Domain

PENNSYLVANIA.—*Dornan v. Philadelphia Housing Authority*, 200 Atl. 834 (Supreme Court, June 30, 1938).—This is an action to test the constitutionality of the Philadelphia Housing Authority Acts, more or less similar to acts passed in 31 other states, designed to facilitate, through the instrumentality of public agencies, the elimination of slums, and to substitute in their stead decent habitations for persons heretofore compelled to live in slum areas.

The Act declares that there exist in communities throughout Pennsylvania numerous slums, together with an acute shortage of safe and sanitary dwellings within the financial reach of persons of low income; and that these conditions encourage the spread of disease, impair public health and morals, increase the risk of fire and accidents, subject the moral standards of the people to bad influences and increase the violation of the criminal law. It states that, because of the prevailing stagnation of business, private industry is unable to cope with this situation. The Act therefore provides for the creation of "Housing Authorities" which shall operate for the clearance, replanning and reconstruction of slum areas, and the providing of safe and sanitary dwellings for the accommodation for persons of low incomes. Such purposes are declared by the Act to be public; money may be spent and private property acquired by eminent domain. The Authorities are to come into existence in and for any city or county when its governing body declares by resolution that there is need therefor. Such an Authority shall not be deemed to be an instrumentality of the city or county or engaged in the performance of municipal functions. The members of the Authority, five in number, are to be appointed by various public officials as specified in the Act. Each Authority is to constitute a public body exercising public powers of the Commonwealth as its agent.

Among the powers granted such Authority are those of cooperating with municipalities and Federal agencies, renting dwellings, acquiring real estate by gift, purchase or eminent domain, and selling or assigning it when not needed for its purposes. Projects are not to be constructed or operated for profit; therefore the Authority is to fix rents for dwellings at no higher rate than sufficient to pay principal and interest on its bonds, and provide for maintenance and operation and the administrative expenses of the Authority. An Authority may issue bonds, on the security of its property and revenues; but the bonds shall not be an obligation of any city or county or of the Commonwealth itself. An Authority may accept grants from the Federal Government. The property of an Authority is declared to be public property used for a public purpose, and is exempt from all taxes except school taxes. In lieu of taxes and assessments the Authority may agree to make payments for improvements, etc., rendered itself or its tenants, not exceeding their estimated cost.

Any state public body may, with or without consideration, dedicate, sell or lease to the Authority playgrounds and paved streets; and appropriate to it the amount needed by it for administrative expenses for a year, as a donation, and from time to time lend or donate money to it.

The Court holds that the property acquired by the Authority will be devoted to a public use. There are two opposing views as to the meaning, in our constitutions, of the words "public use." One school contends that it means use by the public; the other school asserts that its meaning is "public advantage." This Court sustains the second of these meanings: "that anything which tends to enlarge the resources, increase the industrial energies and promote the productive power of any considerable number of the inhabitants of a section of the state, or which leads to the growth of

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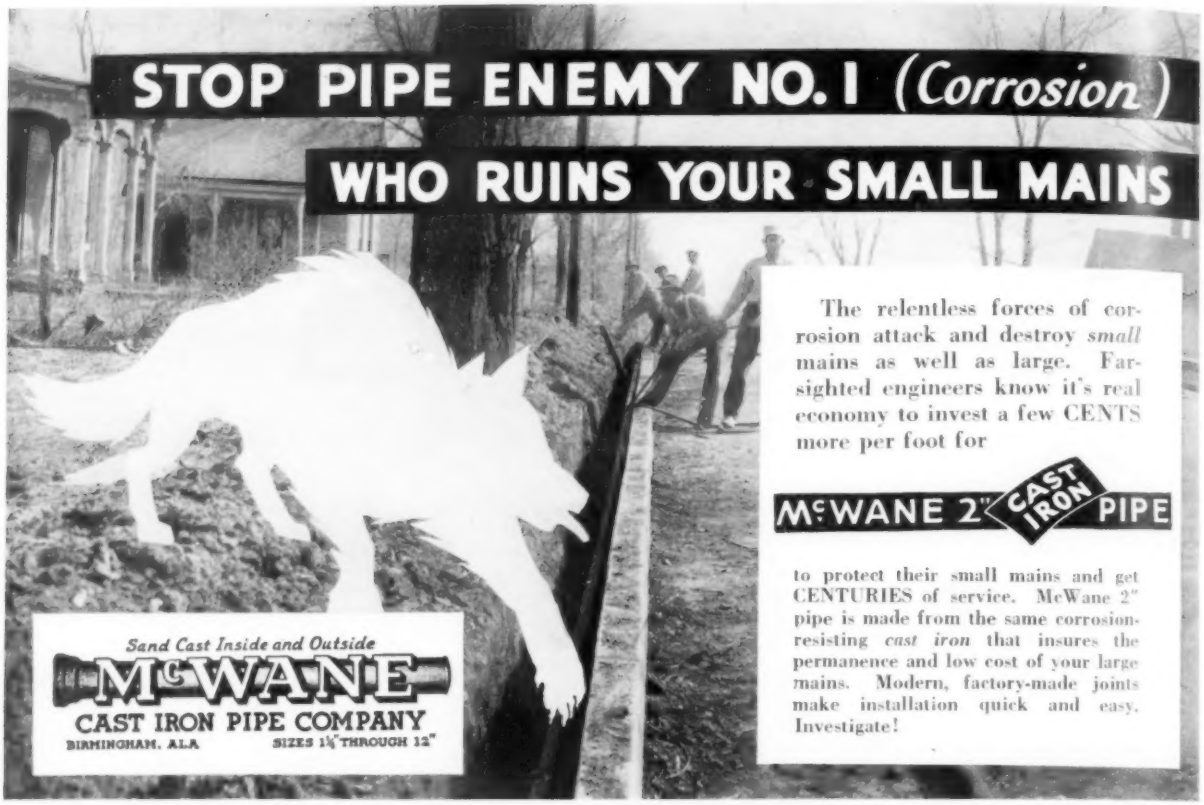

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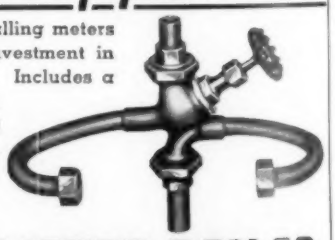

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towns and the creation of new resources for the employment of capital and labor, and manifestly contributes to the general welfare and the prosperity of the whole community, and, giving the constitution a broad and comprehensive interpretation, constitutes a public use."

And a stronger presumption arises in favor of the public nature of the use where the taking is by the government itself instead of a private corporation endowed with the right of eminent domain.

Moreover, the construction of new dwellings is not an independent grant of power, but constitutes a necessary adjunct to the demolition of dangerous and unsanitary dwellings, which in turn is an exercise of the police power of the Commonwealth. The Court is not prepared to say that the Commonwealth or any of its political subdivisions may engage generally in the housing business for supposed public benefit, although there is authority for the proposition that, unlike the Federal Government, which is one of restricted powers, the state, or its municipalities if authorized by it, may engage in certain business enterprises. Here, however, the construction and operation of housing projects are merely ancillary to the underlying purpose of slum clearance. The elimination of unsafe and dilapidated tenements is a legitimate object for the exercise of the police power; but this cannot be done and the ultimate end achieved unless at the same time provision is made for sanitary and wholesome accommodations for those who will lose their homes in the process, or, thus deprived of dwellings at rents within their reach, would then merely be forced into other slums or to create new ones, and the cardinal purpose of the legislation would then be frustrated.

The fact that the dwellings will not be occupied by all but only a few of the public is without legal significance, because the same may be said as to jails, poorhouses, and many other institutions which are necessarily confined to a use, voluntary or involuntary, by certain selected portions of the population. An occupancy by some may promote, or even be vital to, the welfare of all. The taking of land for a public golf course or playground would be for a public use although while some players are using it all other members of the public are necessarily excluded.

It being thus demonstrated that the use to which the housing projects will be devoted is a public one, it follows that the grant to the Housing Authority of the right of eminent domain is valid, and the exemption from state and local taxation is justified.

EDITOR'S NOTE.—See in this connection the Oklahoma case of *Oklahoma City v. Sanders*, in our Notes for September, 1938.

Gasoline Filling Station—Permit—Record of Decision

RHODE ISLAND.—*Tillotson v. City Council of City of Cranston*, 200 Atl. 767 (Supreme Court, July 16, 1938).—This is a petition for a writ of certiorari to review the action of the City Council of the city of Cranston denying a permit to the petitioner for the erection of a gasoline filling station on his property. The application to the City Council for the issuance of the permit was referred by it to the Building Committee for consideration and investigation, with power to hold a hearing on the application. A hearing was held at which witnesses testified that at this location a gasoline filling station would be dangerous because of the possible extension of Atwood Avenue, the establishment of a rotary, and because a trolley-car switch was located immediately in that vicinity. No witnesses were sworn, and in general the hearing does not appear, from the very scanty record certified to this Court, to have been conducted as a judicial inquiry, but rather like a legislative hearing. At its close the Committee convened in executive session and without making any finding of fact or giving any reason why the application should be denied, voted to recommend to the City Council that the application should be denied; and subsequently the City Council at a regular meeting voted to adopt the recommendation of the Building Commissioner, and, without giving any reason, denied the application.

And the Court rules that the report of the Building Commissioner, its recommendation on this report, to the City Council, and the Council's vote denying the petition, be quashed. This leaves the petitioner's application pending before the City Council, to be considered by them de novo in accordance with this opinion.

Assuming, without deciding, that the city ordinance duly provided for regulation, the City Council's denial of the petitioner's application would be valid if based upon the fair and impartial application of a proper rule or standard to the duly ascertained facts of the case. But the decision of such a body should be open to judicial review; and that required that some sort of a record should be made of the rule or standard applied and of the bases of fact for its application in this case. From the record certified to this Court, it does not appear what the rule or standard, if any applied, was, or what the facts were as found by the Council in reaching its decision. For all that appears, the action of the Council may have been arbitrary and unreasonable, as the petitioner asserts. In this situation we must hold that decision invalid.

EDITOR'S NOTE.—It is wiser to appoint a separate board of appeals instead of conferring the power of such a law upon a city council or other legislative body, as otherwise there is the risk that the legislative body, in its semi-judicial duties, will fail to fulfill these duties properly. This danger is shown in the present case.

See generally on this subject Bassett, *Zoning*, p. 131.

Parks and Playgrounds in the Region of Chicago

is the title of a 4-page bulletin obtainable from the Chicago Regional Planning Association, Burnham Building, Chicago, Ill. The bulletin lists for each of 114 communities in the region the acreage in parks, playgrounds and school grounds, and the total acreage of such recreational areas per 1,000 population.

Evaluating Zoning Opinion

Would a percentage rating be feasible?

To the Editor of THE AMERICAN CITY:

Possibly your readers may be interested in the following zoning problem and proposed method of solution, and may comment on or add to the discussion.

In zoning, the physical aspects of a request for a change present little difficulty, as the health and welfare angles are readily determined by accepted sanitary and engineering practice, and the location of the property in the midst of one classification precludes its zoning as another. However, many border-line cases come up where physical aspects permit a more liberal classification and where the property abuts on a classification similar to that requested. In that event the decision does not come from physical aspects, but from opinions and desires.

The usual opinions and desires considered come from a planning board or zoning board; possibly an outside expert; the city as a whole as expressed through civic groups; the property owners in the neighborhood by numbers and by value of holdings. How to weigh such opinions and desires is the problem frequently faced by municipal legislatures. Suppose then that a percentage is applied as the value of each, and for the sake of this discussion arbitrary figures as follows are applied:

A. Planning board opinion	25%
B. Outside expert opinion	15%
C. City-at-large opinion	25%
D. Property owners' desire in point of numbers	25%
E. Property owners' desire in point of holdings	10%
	100%

The theory is to see which side secures over 50 per cent as a guide to determination. Presuming that the Planning Board, the outside expert, and the city at large, favor the change, and that the property owners in number and value of property oppose it, the problem could be summed up as follows:

A.	25%	D.	25%
B.	15%	E.	10%
C.	25%		
	65% in favor		35% opposed

Of course in event of a tie, the opinion of the municipal legislature would be the deciding factor, as it is in any event. The proposal is merely to set up some sort of guide, mathematically, to the usual mental processes, and to eliminate over-estimation of pressure from certain groups.

Possibly the percentages could be submitted by a number of nationally known experts on zoning, each being asked to give his opinion independently, and the final figures determined by the averages of their findings; figures which would be applied in every case.

Your thoughts and those of your readers on the matter would be appreciated.

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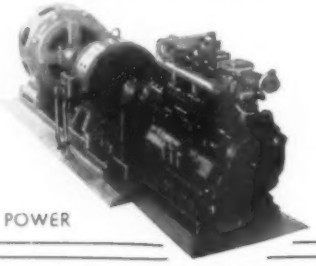

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The City's Legal Rights and Duties

Conducted by A. L. H. STREET, Attorney at Law

Accidents

City held not liable for injury to pedestrian who stumbled over projecting slab in sidewalk, where city did not know of projection, caused by soil erosion, and it was not shown how long the defect existed before the accident (Louisiana Court of Appeal: *Carsey v. City of New Orleans*, 181 So. 819).

City's immunity from liability for negligence in performing governmental functions held to extend to injury to child in park swing, due to breaking of chain (Kentucky Court of Appeals: *Clark v. City of Louisville*, 117 S. W. 2d, 614).

City held not liable for fatal injury to boy who crashed into cement post on municipal playground while playing ball (Rhode Island Supreme Court: *Iacono v. Fitzpatrick*, 199 Atl. 689).

City held liable for injury to householder due to inhalation of gas when city's employee removed meter and left pipe uncapped (Virginia Supreme Court of Appeals: *City of Richmond v. James*, 197 S. E. 416).

Injury to janitress in moving ladder in school building held not to render city liable under compensation act, under act limiting liability to injuries occurring in extra-hazardous work (Maryland Court of Appeals: *Mayor and City Council of Baltimore v. Schwind*, 199 Atl. 853).

City held liable for injuries caused when automobile went out of control after striking hole in pavement and skidding on wet pavement (Georgia Court of Appeals: *Mayor and Council of Buford v. Medley*, 197 S. E. 494).

Statute relieving municipal employees from liability for negligent operation of emergency vehicles held not to relieve municipality from liability (California District Court of Appeal: *Stone v. City and County of San Francisco*, 80 Pac. 2d, 175).

Bond Issues

Statute held to authorize submission to electors of separate proposals for construction or purchase of electric plant but not to authorize proposal to purchase *and* construct lines as a single question (Kansas Supreme Court: *Kansas Utilities Co. v. City of Paola*, 80 Pac. 2d, 1084).

Determination that proposed bond issue would exceed constitutional debt limit held not essential before submitting to electors proposal to issue bonds (Kentucky Court of Appeals: *Daughaday v. City of Paducah*, 118 S. W. 2d, 699).

Constitutional and statutory provisions for refunding municipal debts held not to authorize refunding of sewer bonds payable out of special assessment liens (Kentucky Court of Appeals: *City of Paducah v. Jones*, 118 S. W. 2d, 753).

Decree enjoining tax levy to pay bonds, proceeds of which were used for private real estate development, upheld by divided court (Florida Supreme Court: *Olds v. Alvord*, 181 So. 832).

Civil Service

Wrongfully discharged carpenter in Park Department held entitled to pay where he made seasonable demand for reinstatement (Washington Supreme Court: *Haga v. City of Seattle*, 80 Pac. 2d, 821).

A city having paid salaries to appointees filling vacancies created by removals held not liable to removed policemen and firemen on removals proving to be invalid (Illinois Supreme Court: *Ryan v. City of Chicago*, 15 N. E. 2d, 708).

Condemnation Proceedings

In a proceeding to condemn land for a street extension, tenants' right to compensation with respect to machinery, etc., held dependent upon attachment to the real estate as a permanent fixture thereof (New York Court of Appeals: *In re Whitlock Avenue in City of New York*, 16 N. E. 2d, 281).

Court Costs

Municipalities held not liable for fees or court costs in civil or criminal cases, except as otherwise provided by statute (Washington Supreme Court: *King County v. City of Seattle*, 80 Pac. 2d, 838).

Hospitals

Provision for city-county hospital held invalid as assuming debt beyond current revenues and constitutional limitation, and as invalidly delegating statutory authority (Kentucky Court of Appeals: *Booth v. City of Owensboro*, 118 S. W. 2d, 681).

Licenses

License commissioner held powerless to refuse license to retail dealer on ground that licenses had been issued to other persons under a similar name (New York Supreme Court, New York County: *Radisch v. Morgan*, 5 N. Y. Supp. 810).

Statute authorizing imposition by cities of license taxes upon specified commercial occupations, etc., and "any trade, occupation or profession," held to permit taxing of building mechanics (Kentucky Court of Appeals: *Mills v. City of Barbourville*, 117 S. W. 2d, 187).

Furniture dealer's installment business done in village nearby held not covered by ordinance imposing license tax on hawkers and peddlers (New York Supreme Court, Appellate Division: *Saidel v. Village of Tupper Lake*, 4 N. Y. Supp. 2d, 814).

Municipal Certificates

Borough obtaining loan on certificate that resolution authorizing obtention of the loan had been duly recorded held barred to assert falsity of the certificate (Pennsylvania Supreme Court: *Miners Savings Bank v. Duryea*, 200 Atl. 846).

Municipal Utilities

City's contract to supply water to nearby town held valid and enforceable against city (Utah Supreme court: *Genola Town v. Santaquin City*, 80 Pac. 2d, 930).

Official Tenure

Under Ohio statutes, president pro tem of council, on becoming president when that office became vacant, held entitled to hold the office until expiration of the current term and until selection and qualification of his successor (Ohio Supreme Court: *State v. Oridge*, 16 N. E. 2d, 334).

Ordinances

Petition seeking to enjoin enforcement of police ordinance held insufficient for failing to set forth the ordinance in full (Kentucky Court of Appeals: *City of Louisa v. Fyfee*, 118 S. W. 2d, 726).

Pensions

Under statute providing for pension to fireman's widow for death resulting from injuries in the course of duty, right to pension held not defeated because heart disease contributed to death resulting from exertion in fighting a fire (California District Court of Appeal: *Peters v. Sacramento City Employees' Retirement System*, 80 Pac. 2d, 179).

Police Measures

Ordinance limiting manufacture and sale of fireworks to those handling signaling devices for current daily consumption upheld (Alabama Supreme Court: *Chappell v. City of Birmingham*, 181 So. 906).

Public Utilities

Gas company delivering gas within city to a single customer held subject to excise tax imposed upon those operating a "gas plant" in a city, although the company maintained in the city only a single pipe line that entered the customer's premises at the city limits (Texas Court of Civil Appeals: *Utilities Natural Gas Co. v. State*, 118 S. W. 2d, 927). But a gas company selling gas at wholesale to a local distributing company and to fourteen industrial consumers under special contracts was held not to be taxable as selling gas for "public use" (United States Circuit Court of Appeals, Eighth Circuit: *City of St. Louis v. Mississippi River Fuel Corp.*, 97 Fed. 2d, 726).

Sabbath Observance

Ordinance forbidding automobile sales on Sunday upheld (Colorado Supreme Court: *Rosenbaum v. City and County of Denver*, 81 Pac. 2d, 760).

Slot Machines

Candy-vending machines paying tokens to lucky players held within statute authorizing confiscation of gambling devices (United States Circuit Court of Appeals, Fifth Circuit: *O. D. Jennings & Co. v. Maestri*, 97 Fed. 2d, 679).

Slum Clearance

Louisiana statutes providing for slum clearance by municipal housing authorities in cities of more than 20,000 population upheld against numerous constitutional objections (Louisiana Supreme Court: *State v. Housing Authority of New Orleans*, 182 So. 725). See, also, decision of Pennsylvania Supreme Court upholding similar statutes of Pennsylvania, in *Dornan v. Philadelphia Housing Authority*, 200 Atl. 834.

Streets

Compromise agreement for payment of damages to abutting land through creation of street improvement district held to bar abutter's right to additional damages on subsequent creation of paving district and elevation of street (Tennessee Court of Appeals: *Fuller v. City of Chattanooga*, 118 S. W. 2d, 886).

Forty-six years' delay by city in accepting dedication of land as streets, as shown by plat of subdivision, held not to defeat dedication (Rhode Island Supreme Court: *Marwell Construction Co. v. Mayor and Board of Aldermen of City of Providence*, 200 Atl. 976).

City abandoning street crossing over railroad, in interests of public safety, held not liable for resulting diminution in value of private property abutting on street (Texas Court of Civil Appeals: *City of El Paso v. Sandfelder*, 118 S. W. 2d, 950).

Taxation

Interest received on special assessment bonds held exempt from Federal income tax as being a municipal obligation (United States Circuit Court of Appeals, Seventh Circuit: *Commissioner of Internal Revenue v. Pontarelli*, 97 Fed. 2d, 793).

Constitutional tax limit held inapplicable to bonds issued to fund debts created before tax limit was adopted (Ohio Supreme Court: *State v. Village of Hudson*, 16 N. E. 2d, 266).

Taxpayer upheld in suit to set aside assignment by city of tax certificates held by it, at an inadequate consideration, and an exchange of other certificates for those so assigned (Florida Supreme Court: *R. D. Lamar, Inc., v. Ray*, 182 So. 292).

Land willed to city for use of income in maintaining municipal cemetery and burial lots therein held exempt from taxation under Kansas statute (Kansas Supreme Court: *City of Harper v. Fink*, 80 Pac. 2d, 1080).

Transportation

Certificate granted by Public Utilities Commission for operation of buses between city and suburban communities upheld against protests that existing street-railway service filled public needs and that bus service was extended for sole purpose of giving Commission jurisdiction (Ohio Supreme Court: *City of Cleveland v. Public Utilities Commission*, 16 N. E. 2d, 339).

State law regulating private carriers in cities operating for hire in competition with common carriers upheld against contention that subject was within exclusive control of cities (California Supreme Court: *Morel v. Railroad Commission of California*, 81 Pac. 2d, 144).

Wharves

Five-year contract giving shipping company preferred rights in use of municipal wharf upheld (United States Circuit Court of Appeals, Ninth Circuit: *Femmer v. City of Juneau*, 97 Fed. 2d, 649).

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Municipal and Civic Publications

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The City Clerk's Job

Recording Council Action in the City Clerk's Office.—By Orin F. Nolting, Assistant Director, The International City Managers' Association, and Josephine B. Hollingsworth, Department Librarian, Municipal Reference Department, Los Angeles Public Library. vi + 73 pp. $2.00 from THE AMERICAN CITY.

Although the City Clerk has a major responsibility for the orderly functioning of his City Council's activities, there has heretofore been available no comprehensive handbook for his guidance. This lack has been admirably met in this new publication by The International City Managers' Association.

Experience of 85 city clerks in performing their official tasks contributes to the suggestions for procedure in preparing business for council action, recording and publishing proceedings, filing documents, indexing minutes and ordinances, and safeguarding records.

The guidebook is based on the principle that the minutes of the City Council must be accurately made, properly indexed and safely kept—that they must be available to the citizen or official now or 100 years hence. In formulating procedures based on this principle, the book asserts that the foremost considerations are accuracy, speed, practicability, frequency of use and expense. The Table of Contents includes:

I. Preparation and Organization of Business for Council Action: New Business; Care and Custody of Pending Matters; Reproduction of Draft Measures; Services to Committees; Advertising Public Hearings; Preparation for Council Meeting; The Calendar.

II. The City Clerk in Council Meeting.

III. The Journal of Minutes: Preparation of Minutes; Passed Ordinances and Resolutions; Should Council Proceedings Be Printed?; Practice as to Printed Minutes; Council Minutes Not Printed; Certifying Council Action to Administrative Officers.

IV. Indexing of Council Minutes: Form of Index: Method of Indexing—Loose-leaf Books, Plain Card Index, Visible Card Systems, Visible Record Books; Cumulative Index.

V. Filing the Documents.

VI. The Ordinance Book: Engrossment and Enrollment; Filing Ordinances; Relation to Code of Ordinances; Publication of Ordinances.

VII. Indexing of Ordinances.

VIII. Special Problems: Protection of Records; Legislative Procedure.

Reproductions of sample minutes, card records and other forms add to the value of the book.

Utilities

Service Charges in Gas and Electric Rates.—By Hubert Frank Havlik, Instructor in Economics, Columbia University. Columbia University Press, New York. 284 pp. $2.75 from THE AMERICAN CITY.

This volume is a study of the theory and practice of gas and electric rate making. It is specifically concerned with the problem of service charges. The author has carefully considered the case for and against the service charge, the costs on which charges are and should be based, alternatives to the service charge, and the history of the development of these charges. The present trend in rate practice makes this study of considerable importance to companies, consumers and regulatory commissions alike.

Street Construction

Of special interest in the 1938 Proceedings of the National Paving Brick Association is the discussion of the construction of the Lincoln Tunnel, for which brick paving was chosen to withstand the extremely heavy flow of traffic through the tunnel. The Proceedings include, also, talks on brick pavements built with Federal relief funds in Baltimore, East St. Louis, Ill., and Dunkirk, N. Y.; and specifications and tests for the durability of paving bricks. 48 pp. (Apply to the National Paving Brick Association, National Press Building, Washington, D. C.)

Traffic

Road Traffic and Its Control.—By H. Alker Tripp. The Roadmakers' Library, Vol. 7. (Dr. Percy Edwin Spielmann, Editor.) Longmans, Green & Co., New York. 414 pp. $10.00 from THE AMERICAN CITY.

This book gives a thoroughly comprehensive presentation of the many aspects of the traffic control problem, from the broad principles of traffic policy and street layout to the smallest detail of the placement of an arrow signal or the position of a police officer's forefinger when he is directing traffic. Although written by the Assistant Commissioner of Police, Scotland Yard, London, the material is not limited to British problems, but is applicable in any country. It will serve as an excellent reference or textbook. The material is systematically arranged, with extensive side titles; amply indexed and cross-referenced. Each chapter has been made as self-contained as possible.

The following, while not attempting to list all the contents of the book, includes the principal broad subjects covered: traffic control by law and police—traffic direction, traffic laws, enforcement, public opinion, traffic courts; development of traffic policy—the problem of road safety, of circulation; traffic control by construction and mechanical appliances—road layout and equipment, traffic signs and signals, town planning; road government and administration—classification of roads, authorities responsible for road construction, road finance; road transport; statistics; road casualties.

Urban Land Reserves

"Land Reserves for American Cities," reprinted from the *Journal of Land and Public Utility Economics*, August, 1938, is the title of a paper submitted at the National Conference on Planning held at Minneapolis, June 20-22, by Harold S. Buttenheim, Editor of THE AMERICAN CITY and President of the American Society of Planning Officials, and Philip H. Cornick, staff member, Institute of Public Administration, and Consultant of the New York State Planning Council, as a committee of two on Urban Land Policies.

This paper, an abstract of which was published in the July issue of THE AMERICAN CITY (page 69), summarizes the case for municipal land reserves: giving the advantages of such a policy; outlining the history of the movement; recommending means of acquiring such reserves; and indicating the relation of zoning and planning procedures, and taxation, to the problem. 12 pp. 10c. (Apply to THE AMERICAN CITY, 470 Fourth Ave., New York.)

County Government

A "Survey of Financial Administration of Nebraska Counties" is particularly interesting because in Nebraska county government is still the chief center of political life for the average citizen and, in that state, townships are gradually losing their function and counties are becoming increasingly active.

Undertaken with the help of the WPA and sponsored by the Department of Political Science of the University of Nebraska, this is an extensive survey which, under the head of Financial Administration, not only reviews the sources of county revenue and the ways in which the tax dollar is spent, but analyzes the general philosophy, history, organization, functions and problems of county government, particularly in Nebraska but also with considerable attention to their national aspects. Specific features which are considered are: county officers; county services; revenue and expenditures, reporting, accounting and budgeting, centralized purchasing; need of a clearing house for Nebraska counties and county officers; the problem of metropolitan areas, with particular reference to Douglas County, Nebraska; and a general discussion of the "passing of the township," and of county and city-county consolidation. 275 pp. (Apply to John P. Senning, Department of Political Science, University of Nebraska, Lincoln, Nebr.)

Rehousing in Europe

Europe Re-housed.—By Elizabeth Denby. Published by W. W. Norton & Co., Inc., New York. 1938. 284 pp. $3.50 from THE AMERICAN CITY.

Miss Denby has been closely associated with English housing for some years, and her observations on the accomplishments of other European nations in this field must of necessity be interesting, particularly in their comparative aspects. Six countries are subjected to special analysis in this volume: Sweden, Holland, Germany, Austria, Italy and France. In a final chapter a number of specific criticisms are made of England's housing policy in the light of other European achievements. The author is extremely critical of a policy of moving people outside of cities to places where their social life is inadequate, "while the core of the town stands empty, rotting." She feels the need of improved government direction of housing programs, and recommends that every town and rural area think out and submit its own scheme for development or re-development. She stands for a minimum of roads, and feels that there should be no objection to family cottages with small gardens in central areas at a density of 30 or 40 to the acre. Finally, it is recommended that greater provision be made for the simple recreational enjoyment of citizens and a new education for young children surrounded by a nourishing beauty in order to revitalize the working population.

Government

"Better City Government," the September issue of The Annals. Published by the American Academy of Political and Social Science, Philadelphia, Pa. $2.00, paper; $2.50, cloth.

The purpose of this volume is "to re-examine the problem of valuations in the field of municipal government and to seek to determine what is meant today when we say that one city is governed well and another poorly." It consists of a series of articles by authorities in the various phases of the municipal government field.

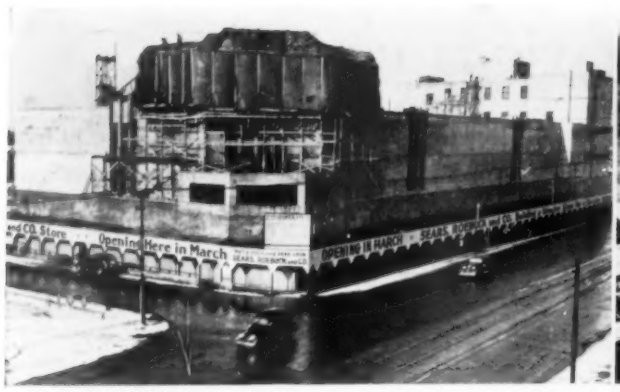
The contents of the volume include: "Principles of Good Municipal Government," a discussion of three criteria of good city government—legality, efficiency and representativeness; "Municipal Government in Practice," an analysis of the various forms of municipal government in particular cities, including a general appraisal of council-manager cities; "Testing the Functions of Municipal Government," a discussion of the measurement of the organization-forms, practices and methods used in particular services, such as education, housing, recreation, public works, welfare, police and fire protection; "Agencies for the Improvement of Municipal Government," which describes some of the bodies that have contributed to the betterment of municipal government; and "Prospects for a Science of Municipal Government." A bibliography is included.

Government

The International City Managers' Association has published a useful booklet, "Government in Small American Cities," which contains, in table form, the name of the city clerk, number of municipal employees, revenues and expenditures for 1937, and net indebtedness, for municipalities of 5,000 to 11,000 population. Officials in cities of this size should find the data, and brief summary given at the beginning of the pamphlet, of interest and value for comparison with their own cities. 36 photo offset pp. $2. (Apply to The International City Managers' Assn., 1313 E. 60th St., Chicago, Ill.)

Building Codes

A number of reprints of new sections of the revised Building Code of the City of Chicago are available at 10c per reprint. Each one contains the chapters passed on one or two particular dates. A list of these with a description of the subject matter of each one may also be secured. (Apply to Municipal Reference Library, 1005 City Hall, Chicago, Ill.)



"OPENING IN MARCH", says the banner on this department store job in Highland Park, Michigan. During the danger period before adequate heating was possible, calcium chloride was used in the concrete.

DURING WINTER MONTHS a calcium chloride admixture in the concrete permitted these sewage treatment tanks in Ohio to be placed as one continuous job, since finishing followed placing in rapid order.

CALCIUM CHLORIDE was used in concrete for floors in this Parkside Housing Project, at Detroit. Year 'round construction of many other F.H.A. projects has been facilitated by calcium chloride.

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It's the same with concrete construction. Not many years ago, the coming of cold weather meant the end of work. Today, the contractor or engineer simply takes the necessary measures for protection against freezing, then adds calcium chloride to the concrete, and carries on his construction schedule uninterrupted by seasonal weather changes.

That calcium chloride cuts the curing time of concrete approximately in half has been proven by the country's foremost technical authorities and backed up on thousands of concreting jobs. The National Bureau of Standards reports, "At 40 degrees F. the standard portland cement concrete attained the safe compressive strength in 14 days . . . Upon the addition of calcium chloride, this same strength, at the same temperature, was attained with the standard cements in 7 days." The Bureau found, too, that with calcium chloride in the mix, the three-year strength is "appreciably increased," and that the flow — the measure of workability — is raised from 29 to 41.

In accelerating the rate of hardening, calcium chloride makes protective measures necessary only half as long, permits early removal of forms, saves labor. In making concrete more workable, forms are filled easier and more completely, a smoother finish is produced, and less pointing-up is required.

Engineers, contractors and building officials who control concreting specifications have made cold weather shut-downs a thing of the past—by including calcium chloride in all concrete placed during cold weather. If you are not already doing so, take advantage of this modern aid to concreting on your present job, your next job. On future jobs, you'll use it automatically.

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Long-Term Planning

Where These Rocky Bluffs Meet—The Story of the Kansas City Ten-Year Plan.—Published by the Chamber of Commerce, Kansas City, Mo. 1938. *xiv* + 293. $2.50.

Kansas City chose the fall of 1931, in the worst of the depression, to initiate a ten-year program of intensive public building and general city improvement. This book gives the history of this unusual depression story to date.

The relative lack of recent progress in municipal improvements in Kansas City during the period before the formation of the ten-year plan is contrasted with the rapid development of public works which took place after its initiation. An account is given of the shaping of the ten-year plan under the auspices of the Chamber of Commerce, its presentation to the people, its carrying-out—the building of a new county court-house, schools, auditorium, hospitals, city hall, police headquarters, fire-houses, city market, and improvements in sewers, water system, airport, roads.

Although the book tends toward promotionalism and would be more convincing if it took more recognition of existing sore spots, its record of achievement should prove stimulating reading to other city and chamber of commerce officials.

Smoke Abatement

Manual of Ordinances and Requirements in the Interest of Air Pollution, Smoke Elimination, Fuel Combustion.—Published by the Smoke Prevention Association, City Hall Square Building, Chicago, Ill. 1938. 160 *pp.* 50c; *paper cover.*

With 90 per cent of the 14,000,000 central-heating plants needing modernization, as this manual estimates, there is indeed need of readers for these 160 pages of information on smoke abatement. An important feature is the answers from 80 cities to a comprehensive questionnaire designed to bring out the ordinance regulations in effect in a number of representative cities from Akron to Yonkers. Included also is the Model Smoke Abatement Ordinance adopted by the Smoke Prevention Association.

Long-Term Financial Planning

Effectively gotten up is the "Long-Term Program of Capital Expenditures" prepared by city planning engineers and the City Manager for the city of San Diego, Calif. Necessary and desirable city improvements with their estimated costs are listed in the order it is tentatively recommended they be carried out. With a view to analyzing the possibilities of achieving the objects of the program, city improvements for the past ten years are summarized and an appraisal given of the community's ability to pay for the projects contemplated. Because financial data are presented largely by tables and charts and planning data by maps, the principal substance of the report can be quickly and easily noted. The back cover of the booklet is arranged in such a way as to form a key map upon which the various project maps (of proposed streets, sewers, etc.)—which are done on transparent paper—can be separately superimposed, thus showing the location of projects on this key map. 45 pp.; plastic binding. (Apply to Glenn A. Rick, City Planning Commission, San Diego, Calif.)

Foreign Housing Agencies

A Division of Foreign Housing Studies of the Works Progress Administration has published the first results of its work, five pamphlets containing data on the functions and organization of (1) Housing Agencies in France, (2) Housing Agencies in Italy, (3) Housing Agencies in Denmark and Spain, (4) Housing Agencies in Chile and Argentine, and (5) Housing Agencies in the Soviet Union. In each of these studies the organizations concerned with housing in the country under consideration are analyzed one by one as to functions, finances, organization, accomplishments, dwellings and tenants, and miscellaneous subjects. There are included charts showing the national interrelation of housing agencies and local and financial set-ups. These studies should be helpful to those concerned with setting up new housing agencies of various types in this country. 52, 52, 40 + 34, 37 and 54 pp. respectively. A limited number of copies available free on request. (Apply to the New York City Housing Authority, 10 E. 40th St., New York.)

School and City

Schools and City Government.—By Nelson B. Henry, Associate Professor of Education, and Jerome G. Kerwin, Associate Professor of Political Science, University of Chicago. The University of Chicago Press, Chicago. 1938. *xi* + 104 *pp.* $1.50 *from* THE AMERICAN CITY.

In the majority of cities of over 50,000 population in the United States, the school enjoys a unique autonomy of government, independent of municipal control and usually free even from interference by the state, to which the school is generally considered responsible. Between educators and political scientists there is a traditional difference in point of view as to whether the school should be thus isolated: educators subscribing to the theory of educational independence, political scientists to the view that there should be coordination between school and city government if not actual control of the former by the latter.

This book is an inquiry into the relative advantages and disadvantages of the two set-ups. Examination was made of the following aspects of school and city relationships: the structural set-up of the schools in the general framework of local government; fiscal relationships; relations between the school and the city in the fields of construction, building maintenance, purchasing, health service, safety education, recreation, civil service, juvenile delinquency; and the selection of the school board.

The conclusion is reached that, despite strong public opinion to the contrary, cooperation between municipality and school is definitely advantageous to the community; and that, on the average, the disadvantages which have commonly been thought to come to the school from such an interrelationship exist as frequently in communities where the school is entirely independent as they do in communities where such a relationship exists.

Consumer Incomes

The National Resources Committee has put out another most interesting and significant report, "Consumer Incomes in the United States—Their Distribution in 1935-36." Part I of the study gives a general picture of the distribution of income among all consumers, revealing the startling contrasts in income received by the very small high-income group and the very large low-income group. For example, the poorest third of the population received only 10 per cent of the national income, about the same amount as that received by the richest one-half of one per cent of the population. Part II of the study considers separately the incomes of the nation's three income-spending units—the family, the individual and the institutional resident, with particular detail to the family. Differences in income of different-sized families, of families in different regions, of urban and rural families, of families of different occupations, and of white and Negro families, are analyzed.

If it is true that we will approach the solution of our economic and social problems by planning based on scientific data, then the accumulation of data in studies such as this is a fundamental contribution to the solution of basic national problems. 104 pp. 30c. (Apply to Government Printing Office, Washington, D. C.)

Child-Welfare Legislation

The Children's Bureau of the U. S. Department of Labor has published a bulletin summarizing the child-welfare legislation passed in the United States and its territories during 1937. Legislation on the following subjects is covered: state and local welfare departments; aid to dependent children in their own homes; dependent and neglected children; adoption and change of name; children born out of wedlock; birth certificates; marriage; offenses against minors; delinquency and juvenile courts; probation and parole; institutions for delinquent minors; recreation; mental defectives; physically handicapped children; child hygiene and public health; child labor; and compulsory school attendance. Summaries of the data at the beginning of each chapter give a quick view of progress in raising standards in this field, during the year. The material, listed according to states, includes considerable information on municipal powers and responsibilities in this field. 91 pp. 10c. (Apply to U. S. Govt. Printing Office, Wasnington, D. C.)

City and Church

City and Church in Transition.—By Murray H. Leiffer. Willett, Clark & Co., Chicago, Ill. 1938. *xiii* + 301 *pp. including index.* $2.50 *from* THE AMERICAN CITY.

The Home Missions Council, an interdenominational organization, is making a special study this year, 1938-1939, of the church in the city. Among the off-springs of this study are "City and Church in Transition" and "Urban Scene." (See listing below.)

"City and Church in Transition" is a study, not only of the interaction of city and church in the medium-sized city of 100,000, but of the characteristics, trends, problems of this adolescent "in-between" city, "Mediopolis," of which there are 140 in the United States, containing 10 per cent of the population of the country. This study gains particular significance from the fact that, although the city of this size is growing in number and importance, it has been very little studied. The book is written in an easily flowing style, and makes absorbing reading.

The first half of the book deals with a description of five different types of Mediopolis: the commercial city, the prototype of Mediopolis; the industrial city, Mediopolis in overalls; the industrial suburb, the workshop of the nation; the residential suburb, the parlor of the metropolis; the resort city, the playtown of the nation. The second half of the book analyzes the changes that the church undergoes as the city grows; the special status, problems and opportunities of the church in each of the five types of Mediopolis.

The Council of Social Action of the Congregational and Christian Churches has devoted the July number of its monthly periodical, *Social Action*, to the "Urban Scene," a brief but inclusive presentation of the city's problems and their possible solutions, for the layman. Its story is told largely by photographs, accompanied by brief discussion in simple, direct and forceful style. Its theme, illustrated by Wesley's statement, "You can't save a man when his feet are cold," is that, before the church can hope to bring religion to people, it must care for their crying physical and social needs. Included in the wide range of city problems scanned, are the following: housing, recreation and parks, delinquency, health and disease, unemployment, cooperative associations, child labor, congestion, regional planning, sanitation and race discrimination.

This is the sort of handbook which one wishes every city dweller might read. 63 pp. 10c. (Apply to Council for Social Action of the Congregational and Christian Churches, 289 Fourth Avenue, New York City.)

Housing Progress

The United States Housing Authority has just issued a very attractive brochure entitled "New Cities, New Citizens: The Program of the United States Housing Authority." It is essentially a summary of the accomplishments of the Authority to date and a statement of its ideals and methods. Interesting facts and figures are given, such as that of a 300 per cent increase in the number of local housing authorities since November 1, 1937, making a total of 178 authorities throughout the country. (Apply to the United States Housing Authority, Dept. of the Interior, Washington, D. C.)

Legislation

The Department of Economics of Massachusetts State College has compiled an index to legislation in 1938 relating to municipalities in Massachusetts. Statutes are briefly described, and chapter numbers given. The material is conveniently arranged by subject, with a municipal index enabling the reader to find any legislation passed for any particular town or city. 24 mimeographed pp. (Apply to Charles J. Rohr, Dept. of Economics, Massachusetts State College, Amherst, Mass.)

Other Reports Received

CHICAGO, ILL.—"Regional Planning Progress." Chicago Regional Plan Assn. Aug., 1938. 8 pp.

FLINT, MICH.—"The Participation of Flint Citizens in Elections." By Max P. Heavenrich, Jr. Sept. 7, 1938. The Flint Institute of Research and Planning. 35 pp.

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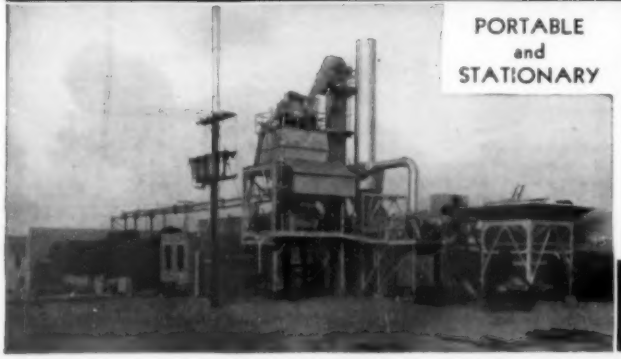

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Conventions -- When and Where

Meeting is annual convention unless otherwise designated

OCTOBER 6-8.—HARTFORD, CONN.
Joint meeting. (Hotel Bond.) *New England Sewage Works Association.* Sec., F. W. Gilcreas, State Dept. of Health, Albany, N. Y. *New York State Sewage Works Association.* Sec.-Treas., A. S. Bedell, State Dept. of Health, Albany, N. Y.

OCTOBER 9-11.—CHICAGO, ILL.
Institute of Traffic Engineers. (Stevens Hotel.) Sec.-Treas., Harold F. Hammond, 60 John St., New York.

OCTOBER 10-12.—MILWAUKEE, WIS.
American Water Works Association—Wisconsin Section. (Plankinton House.) Sec., L. A. Smith, City Hall, Madison, Wis.

OCTOBER 10-13.—GULFPORT-BILOXI, MISS.
Montana National Bituminous Conference. (Edgewater Gulf Hotel.) Montana Highway Department. Address: Gen. Chmn., D. A. McKinnon, State Highway Dept., Helena, Mont. Western Refiners Association. Pres., C. M. Boggs, Tulsa, Okla.

OCTOBER 10-14.—CHICAGO, ILL.
National Association of Public School Business Officials. (Palmer House.) Sec., H. W. Cramblet, Board of Education, Pittsburgh, Pa.

OCTOBER 10-14.—CHICAGO, ILL.
National Safety Council. (Stevens Hotel.) M'ng Dir., W. H. Cameron, 20 N. Wacker Drive, Chicago, Ill.

OCTOBER 11-14.—FRENCH LICK, IND.
American Institute of Steel Construction. (French Lick Springs Hotel.) Sec., V. G. Iden, 200 Madison Ave., New York.

OCTOBER 11-14.—WASHINGTON, D. C.
National Association of Housing Officials. (Wardman Park Hotel.) Dir., Coleman Woodbury, 1313 E. 60th St., Chicago, Ill.

OCTOBER 12-14.—ROCHESTER, N. Y.
American Society of Civil Engineers. Fall meeting. Sec., G. T. Seabury, 33 W. 39th St. N. Y.

OCTOBER 12-14.—KEARNEY, NEBR.
League of Nebraska Municipalities. (Fort Kearney Hotel.) Sec.-Treas., C. E. Beals, 204 Brownell Bldg., Lincoln, Nebr.

OCTOBER 13-15.—DES MOINES, IOWA.
American Water Works Association—Missouri Valley Section. (Hotel Fort Des Moines.) Sec., Earl L. Waterman, Univ. of Iowa, Iowa City, Iowa.

OCTOBER 13-14.—NEENAH-MENASHA, WIS.
Central States Sewage Works Association. (Valley Inn.) Sec., W. H. Wisely, State Dept. of Public Health, Springfield, Ill.

OCTOBER 13-14.—MADISON, WIS.
League of Wisconsin Municipalities. Sec., Frederick MacMillin, 30 E. Johnson St., Madison, Wis.

OCTOBER 16-20.—MEMPHIS, TENN.
American Cemetery Owners Association. Exec. Sec., Roy Hatten, 408 Wolverine Bldg., Ann Arbor, Mich.

OCTOBER 17-20.—OKLAHOMA CITY, OKLA.
American Water Works Association—Southwest Section. (Biltmore Hotel.) Sec.-Treas., Lewis A. Quigley, 3320 W. Berry St., Fort Worth, Texas.

OCTOBER 17-21.—WASHINGTON, D. C.
Civil Service Assembly of the United States and Canada. Exec. Dir., G. Lyle Belsley, 1313 E. 60th St., Chicago, Ill.

OCTOBER 17-19.—DES MOINES, IOWA.
National Society of Professional Engineers. (Hotel Fort Des Moines.) Sec., T. Keith Legare, Columbia, S. C.

OCTOBER 19-21.—CINCINNATI, OHIO.
National Association of Assessing Officers. (Hotel Gibson.) Exec. Dir., Albert W. Noonan, 1313 E. 60th St., Chicago, Ill.

OCTOBER 19-21.—ATLANTIC CITY, N. J.
Pennsylvania Water Works Association. (Haddon Hall.) Sec., Dr. F. Herbert Snow, 327 Telegraph Bldg., Harrisburg, Pa.

OCTOBER 21-22.—ASBURY PARK, N. J.
American Water Works Association—New Jersey Section. (Berkeley-Carteret Hotel.) Sec.-Treas., H. N. Lendall, College of Engineering, Rutgers Univ., New Brunswick, N. J.

OCTOBER 23-26.—NEW ORLEANS, LA.
National Association of Commercial Organization Secretaries. (Hotel Roosevelt.) Asst. Sec.-Treas., Mrs. Norma McKellops, 1615 H St., N. W., Washington, D. C.

OCTOBER 24-25.—IOLA, KANS.
Kansas Association of Municipal Utilities. Sec.-Treas., L. C. Angevine, McPherson, Kans.

OCTOBER 24-28.—DETROIT, MICH.
National Tax Association. (Hotel Statler.) Sec., W. G. Query, South Carolina Tax Commission, Columbia, S. C.

OCTOBER 25-28.—KANSAS CITY, MO.
American Public Health Association. Exec. Sec., Dr. Reginald M. Atwater, 50 W. 50th St., New York.

OCTOBER 25-28.—KANSAS CITY, MO.
Conference of State Sanitary Engineers. Sec.-Treas., R. E. Tarbett, United States Public Health Service, Washington, D. C.

OCTOBER 26-29.—RIVERSIDE, CALIF.
American Water Works Association—California Section. (Mission Inn.) Sec.-Treas., Carl M. Hoskinson, Division of Water, Sacramento, Calif.

OCTOBER 26-28.—PORT ARTHUR, TEXAS.
League of Texas Municipalities. Exec. Sec., E. E. McAdams, 2220 Guadalupe Street, Austin, Texas.

OCTOBER 31-NOVEMBER 2.—GREENSBORO, N. C.
Joint meeting. (King Cotton Hotel.) *American Water Works Association—North Carolina Section. North Carolina Sewage Works Association.* Acting Sec., A. R. Hollett, Chapel Hill, N. C.

NOVEMBER 2-4.—LEXINGTON, KY.
American Country Life Association. (Univ. of Kentucky.) Exec. Sec., Benson Y. Landis, 105 E. 22d St., New York.

NOVEMBER 7-12.—MILWAUKEE, WIS.
National Association of Real Estate Boards. (Schroeder Hotel.) Exec. Sec., Herbert U. Nelson, 59 E. Van Buren St., Chicago, Ill.

NOVEMBER 7-9.—SAN ANTONIO, TEXAS.
Texas Public Health Association. (Gunter Hotel.) Sec., P. A. Kerby, State Board of Health, Austin, Texas.

NOVEMBER 8-9.—AUGUSTA, MAINE.
Maine Municipal Association. Exec. Sec., Roy H. Owsley, City Hall, Hallowell, Maine.

NOVEMBER 14-19.—HAVANA, CUBA.
Pan American Congress of Municipalities. Congress. Address: Clifford W. Ham, Exec. Sec., American Municipal Association, 1313 E. 60th St., Chicago, Ill.

NOVEMBER 15-18.—NEW ORLEANS, LA.
National Association of Railroad and Utilities Commissioners. Sec., Clyde S. Bailey, Earle Bldg., Washington, D. C.

NOVEMBER 15-17.—GULFPORT, MISS.
National Association of State Auditors, Comptrollers and Treasurers. Sec., Thomas H. Judd, Deputy State Treasurer, Hartford, Conn.

NOVEMBER 16-18.—DETROIT, MICH.
Michigan Municipal League. Acting Dir., Herbert A. Olson, 205 S. State St., Ann Arbor, Mich.

NOVEMBER 17-18.—ATLANTIC CITY, N. J.
New Jersey State League of Municipalities. Exec. Sec., S. S. Kenworthy, 808 Trenton Trust Bldg., Trenton, N. J.

NOVEMBER 30.—NEW YORK CITY.
American Standards Association. (Astor Hotel.) Sec., P. G. Agnew, 29 W. 39th St., New York.

NOVEMBER 30-DECEMBER 2.—WASHINGTON, D. C.
Highway Research Board of the National Research Council. Dir., Roy W. Crum, 2101 Constitution Ave., Washington, D. C.

DECEMBER 1.—WASHINGTON, D. C.
American Federation of Housing Authorities. (Hay-Adams House.) Pres., Langdon W. Post, 346 Broadway, New York.

DECEMBER 1-3.—PENSACOLA, FLA.
Florida League of Municipalities. Sec.-Treas., E. P. Owen, Jr., 1201 Lynch Bldg., Jacksonville, Fla.

DECEMBER 1-3.—BALTIMORE, MD.
National Municipal League. Sec., Howard P. Jones, 309 E. 34th St., New York.

DECEMBER 5-9.—DALLAS, TEXAS.
American Association of State Highway Officials. Exec. Sec., W. C. Markham, 1220 Nat'l Press Bldg., Washington, D. C.

DECEMBER 5-9.—NEW YORK CITY.
American Society of Mechanical Engineers. Nat'l Sec., C. E. Davies, 29 W. 39th St., New York.

DECEMBER 8-11.—WASHINGTON, D. C.
American Public Welfare Association. (Wardman Park Hotel.) Dir., Fred K. Hoehler, 1313 E. 60th St., Chicago, Ill.

DECEMBER 28-30.—DETROIT, MICH.
Tax Policy League. Exec. Sec., Dr. Mabel L. Walker, 309 E. 34th St., New York.

JANUARY 12-14.—WASHINGTON, D. C.
American Engineering Council. (Hotel Mayflower.) Exec. Sec., Frederick M. Feiker, 744 Jackson Pl., Washington, D. C.

JANUARY 18-20, 1939.—NEW YORK CITY.
American Society of Civil Engineers. Sec., George T. Seabury, 33 W. 39th St., New York.

JANUARY 20-21.—WASHINGTON, D. C.
National Public Housing Conference. Sec., Helen Alfred, 112 E. 19th St., New York.

JANUARY 23-26.—PITTSBURGH, PA.
American Society of Heating and Ventilating Engineers. (Hotel William Penn.) Sec., A. V. Hutchinson, 51 Madison Ave., New York.

JANUARY 23-27.—LAFAYETTE, IND.
Purdue Road School. (Purdue Univ.) Address: Ben H. Petty, Professor of Highway Engineering, Purdue Univ., Lafayette, Ind.

FEBRUARY 15-17.—NEW YORK CITY.
Association of Highway Officials of North Atlantic States. (Hotel Penn-sylvania.) Sec.-Treas., A. Lee Grover, State Highway Dept., Trenton, N. J.

FEBRUARY 20-22.—OTTAWA, ONT.
Engineering Institute of Canada. (Chateau Laurier.) Gen. Sec., L. Austin Wright, 2050 Mansfield St., Montreal, Que.

FEBRUARY 21-23.—NEW YORK CITY.
American Concrete Institute. (Roosevelt Hotel.) Sec., Harvey Whipple, 407 New Center Bldg., Detroit, Mich.

FEBRUARY 21-24.—WICHITA, KANS.
Southwest Road Show and School. (Municipal Exposition Bldg.) Mgr., F. G. Wieland, 225 S. Water St., Wichita, Kans.

FEBRUARY 27, WEEK OF.—LOS ANGELES, CALIF.
The Asphalt Institute. (Biltmore Hotel.) M'ng Dir., J. E. Pennybacker, 801 Second Ave., New York.

MARCH 7-10.—SAN FRANCISCO, CALIF.
American Road Builders' Association. Engr.-Dir., Charles M. Upham, 952 Nat'l Press Bldg., Washington, D. C.

MARCH 9-10.—TRENTON, N. J.
New Jersey Sewage Works Association. (Stacy-Trent Hotel.) Sec., John R. Downes, Bound Brook, N. J.

MARCH 27.—NORWALK, CONN.
New England Association of Commercial Executives. Sec., Peter Foley, Norwalk, Conn.

APRIL 3-4.—BOSTON, MASS.
Massachusetts Safety Conference. (Hotel Statler.) Gen. Mgr., Lewis E. MacBrayne, 89 Federal St., Boston, Mass.

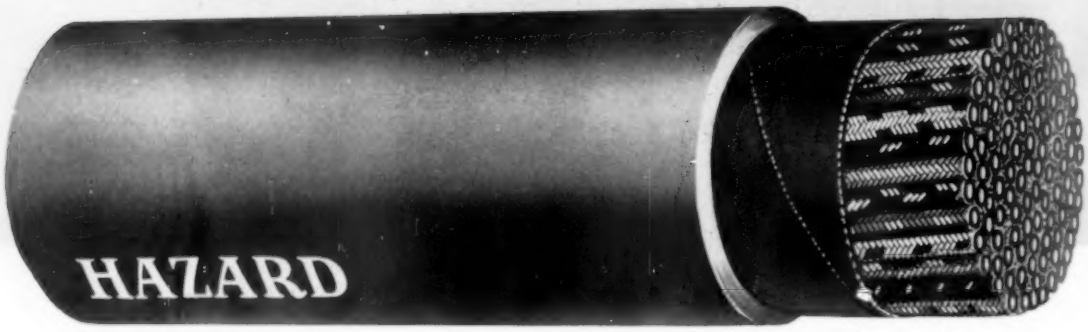
APRIL 12-14.—TORONTO, ONT.
American Water Works Association—Canadian Section. (Royal York Hotel.) Sec.-Treas., Dr. A. E. Berry, Dept. of Health, Parliament Bldg., Toronto, Ont.

MAY 8-13.—CHICAGO, ILL.
National Fire Protection Association. M'ng Dir., Franklin H. Wentworth, 60 Batterymarch St., Boston, Mass.

JUNE 18-24.—BUFFALO, N. Y.
National Conference of Social Work. Gen. Sec., Howard R. Knight, 82 N. High St., Columbus, Ohio.

HAZARD PERMEX

THIN WALL RUBBER INSULATION



is used where it is necessary to get a great number of small, separately insulated conductors into a limited space. Permex is ideal for multi-conductor telephone cables, supervisory control, fire and police alarm and other low voltage circuits in limited duct space.

Hazard Permex insulation is made of best grade Hevea rubber in combination with carefully selected mineral and organic ingredients. Permex meets IMSA Specification #17-1937 for Thin Insulated Signal Cable.

PERMEX CHARACTERISTICS

1. TOUGHNESS AND RESILIENCY. Permex rubber insulation has a tensile strength of over 2500 lbs. per square inch and will elongate more than 500%. With only a thin wall of insulation on each conductor these qualities are necessary so as to enable it to withstand the compression and other strains incident to manufacturing processes.

2. NON-CORROSIVE. Since the conductors in Permex Cables are usually very small, any corrosion of the copper by chemical reaction would seriously impair the life of the cable. Permex insulation is so compounded and processed that there is no tendency to corrosion even after many years' service.

3. ABILITY TO STAND EXPOSURE. The insulation is so compounded and cured as to give it great resistance to oxidation. It will stand exposure to light and air without early hardening or cracking.

4. FREE STRIPPING. Permex insulation fits tightly around the conductor, but does not adhere to such an extent as to make it difficult to splice or connect.

5. LONG LIFE. At the conclusion of the standard four-day oxygen bomb accelerated age test, Permex insulation has a tensile strength of 2000 lbs. per square inch or more, giving indication of the long life that may be expected under actual service conditions.

HAZARD INSULATED WIRE WORKS

DIVISION OF THE OKONITE CO.

WORKS: WILKES-BARRE, PENNSYLVANIA

New York Chicago Philadelphia Atlanta Pittsburgh Buffalo Boston Detroit
Seattle Dallas Washington San Francisco St. Louis Los Angeles

News and Illustrations

Items of Interest to City, Town and County Officials, and Others Concerned with the Economical Construction and Efficient Operation of Public Improvement Undertakings

Pipe Joint Compound for Water Lines

The Rockwood Sprinkler Co., Worcester, Mass., has recently placed on the market the Rockwood Pipe Joint Compound for sealing pipe joints and gaskets on hot and cold water lines and on steam lines, as well as air and oil lines. This joint compound is the result of extensive research by the chemists of the Rockwood Sprinkler Co., user of a very large amount of joint compound in its own work. This new compound has been used for over two years by Rockwood's own pipe fitters operating in all sections of the country, and has been given extensive field tests by leading plumbing contractors and pipe maintenance departments in industrial plants.

Among the advantages claimed for this compound are: it lubricates the threads while the pipe joint is being made up; it makes a tight metal-to-metal joint; the surface hardens into a protective skin which eliminates oil drops when the compound is properly applied; it seals without cementing; a little compound goes a long way; it comes in cans ready for instant use without thinning; the solid matter in the compound remains in suspension while in the can; it does not injure the skin, because it contains no harmful chemicals or impure animal oils; it has no objectionable odor and will not taint or discolor drinking water.

Magnetite Filters for Sewage Works

The Filtration Equipment Corporation, 10 East 40th Street, New York, has recently released a new 12-page illustrated bulletin on the Automatic Magnetite Filter for the removal of suspended solids from sewage effluents, trade wastes and water. The bulletin is replete with photographs and plans of installations, charts showing operating characteristics, and detailed text.

The Magnetite Filter strains out light solids and minute impurities which cannot be removed or settled out by sedimentation. It is made in upflow and downflow types. Further details and a copy of the new bulletin may be secured by writing direct to the manufacturer and mentioning THE AMERICAN CITY.

News from Heil Company

The Heil Co., Milwaukee, Wis., has moved its Buffalo branch to larger quarters at 2139 North Fillmore Avenue. Karl Maas, formerly a member of the Heil sales organization at the New York branch office, is now in charge of the Buffalo branch.

Jack Davies, Southeastern District Manager, who has been located at Baltimore, Md., will move his headquarters to Atlanta, Ga., and will have charge of sales of Heil hydraulic dump units, transportation tanks and hydraulic scrapers in Louisiana, Mississippi, Alabama, Tennessee, Georgia, Florida, North and South Carolina and Virginia. The Heil headquarters in this area will be located at 423 Claremont Avenue, Decatur, Ga., a suburb of Atlanta.

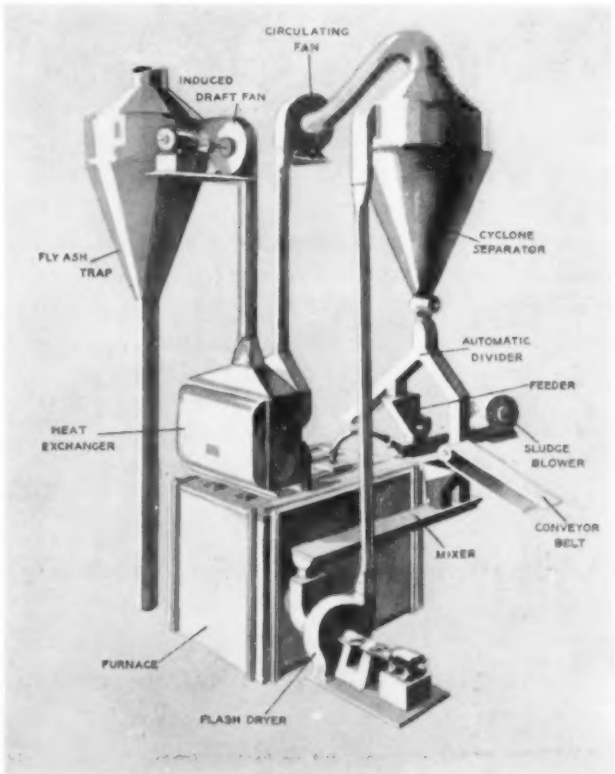
Sludge Drying and Incineration

The C-E Raymond system of sludge drying and incineration, which is being marketed in the sanitary engineering field by The Dorr Co., Inc., 570 Lexington Avenue, New York, may be used either to incinerate sludge to a dry powdered ash or simply to dry it and produce a powdered fertilizer. In operation, the wet sewage sludge filter cake from a vacuum filter is delivered to a mixer by means of a belt conveyor. It is blended with a portion of sludge which has been previously heat-dried by the system. Mixing the wet sludge filter cake with the heat-dried sludge produces a flaky product of uniform consistency with a lower average moisture content, which is readily carried through the drying stage of the system by the high velocity of the hot gases.

Flash - drying with this system consists of drying the sludge particles in suspension in a stream of hot gases, so as to insure practically instantaneous removal of moisture. This is a continuous and automatic operation in which the dried product is handled under dust - proof conditions. Hot gases are used directly for drying, and hence there are no conversion losses, such as from fuel to steam and from steam to air. From the Flash - Dryer the gas - formed sludge particles pass to a cyclone separator, where dried sludge is removed from the moisture - laden and considerably cooled gases. Circulation of gas and sludge through the drying system is produced by a fan at the gas outlet at the cyclone separator. This treatment does not overheat or ignite the dry sludge particles, and there is no loss of the fertilizer ingredients during the drying operation.

If disposal of the sludge by incineration is desired, the dried sludge, except for a portion recirculated to the drying system, either is diverted or is blown to the incinerator. In certain cases there may be enough surplus sludge to allow such a diversion without the necessity of using other fuel. In most cases where sludge is diverted, it is necessary to supply its heat equivalent from auxiliary fuel such as oil or sludge digester gas. The dried sludge collected in a sludge bin is uniformly fed into a duct which connects the pressure side of the sludge blower to the sludge burner in the combustion chamber of the furnace. The sludge blower, in addition to conveying the sludge to the furnace, also supplies the major portion of the air required for combustion.

The details of the C-E Raymond system of sludge drying and incineration are given in text, diagrams and photographs, in Bulletin No. 6781 which may be secured from The Dorr Co., Inc., by readers mentioning THE AMERICAN CITY.



FUNCTIONAL SKETCH OF THE C-E RAYMOND SLUDGE DRYER AND INCINERATOR

Tangled traffic . . . with its constant menace to the work of police and fire departments . . . is only one part of the tremendous Public Safety problem faced by municipalities today.

Losses to person and property due to *preventable* traffic accidents, crime, and fire run to *billions* of dollars.

Efficient electrical Public Safety equipment can play an important part in preventing these losses . . . at only a tiny fraction of the present enormous cost of the losses.

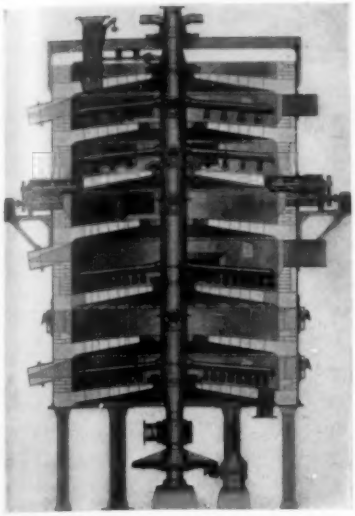
Graybar offers a convenient source of *all* Public Safety equipment . . . Modern Traffic Control . . . Union Metal Street Lighting . . . Parking Meters . . . Horni Fire-Alarm Systems . . . Western Electric Police Radio. Graybar offers, too, experienced advice on technical problems, and behind every product stands a Graybar reputation for dependability since 1869. Write for information!

OFFICES IN 85 PRINCIPAL CITIES. EXECUTIVE OFFICES: GRAYBAR BUILDING, NEW YORK.

Distributed and guaranteed by GraybaR ELECTRIC COMPANY

GraybaR

PUBLIC SAFETY EQUIPMENT DISTRIBUTED BY GRAYBAR:



THE MULTI-ZONE MULTIPLE HEARTH FOR BURNING SEWAGE SLUDGE AND SCREENINGS

New Furnace Burns Sludge and Screenings

The new Multi-Zone multiple hearth furnace for the incineration of sewage sludge and screenings is produced by the Underpinning & Foundation Co., Inc., 155 East 44th Street, New York, for which Allied Engineering Equipment Corporation, Cunard Building, Philadelphia, Pa., is the sole sales representative.

The Multi-Zone furnace is reported to be capable of incinerating sewage sludge with a moisture content as high as 75 per cent without odor and without fuel. Screenings and other organic matter can also be incinerated in this furnace in a similar manner. It is made with a drying zone, a burning zone, and a zone for cooling the ash before discharge from the lower hearth. The zones are isolated from each other by zoning valves, so that drying can be accomplished at the most suitable temperature. This feature eliminates fluctuations in furnace temperatures, and particularly fluctuation of the temperature of the gases of combustion leaving the furnace.

Hot air, used for drying, is pre-heated in the incinerating zone and then introduced immediately over the wettest material. After absorbing all moisture possible, it is returned to the incinerating zone for the removal of the moisture and the incineration of noxious gases. The waste gases are discharged at a low temperature, and it is possible to utilize induced draft fans economically, thus eliminating the need for high chimneys.

In operation, the moisture-laden sewage solids are fed directly into the top of the incinerator through a balanced gate synchronized with the rotation of the center shaft, rabble arms and rabble teeth. The rabble arms and rabble teeth, through suitable ports, properly distribute this material over the hearths below. The center shaft and rabble arms are air-cooled and they rotate as a single unit at a speed which may be varied to suit conditions. Automatically controlled oil burners are installed in the hearths of the incinerating zone, furnishing the heat needed to bring the furnace up to the required temperatures in starting or in other emergencies. The flow of air and material in the drying zone is concurrent, and in the incinerating zone it is counter-current.

Multi-Zone furnaces can be used for total reduction to clean clinker and ash, or merely for sludge drying, preparatory to its use as a fertilizer. This flexibility is made possible by the separate zoning arrangement. The waste heat from a refuse incinerator can be used economically for drying sludge and screenings in a Multi-Zone furnace. The dried sludge can be used as a fertilizer or returned to the incinerator for burning.

Motor Compressors for Public Utilities

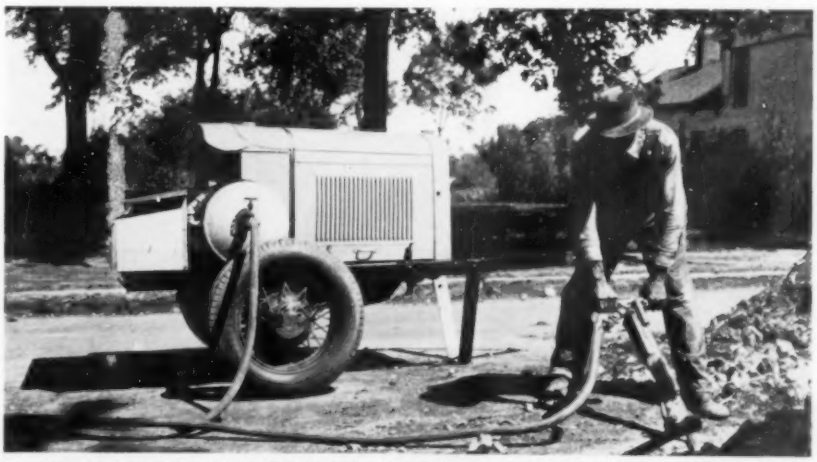
The Smith motor compressor shown in the accompanying illustration is owned by the Kentucky-Tennessee Light and Power Co., of Hopkinsville, Ky. This company owns the electric, water and gas distribution systems in Hopkinsville, where practically all pole holes and ditches must be drilled and blasted through solid rock for about two feet below the street surface. This compressor is in almost constant use by the three departments in digging pole holes, cutting asphalt pavement, breaking concrete gutters, drilling rock and tamping backfill. It is also used in testing new mains, calking cast iron pipe, and painting buildings owned by this company.

This motor compressor, made by Gordon Smith and Co., Bowling Green, Ky., comprises a completely reconditioned Ford motor equipped with a Smith Compressor Head, water pump, Pierce motor governor, R. C. pilot valve, unloader cylinders, idling device, new carburetor, and air filters on the compressor intakes and carburetor, and has been in service for over three years. The District Manager of the utility states that they have just recently exchanged the Ford motor for a reconditioned unit at a cost of $50, this being the only expense for repairs in the three years of almost daily operation.

THE LITE-GUARD METAL GLOBE, SHOWING TWO OF THE BULL'S-EYES

New Lantern Globe Less Easily Broken

A new type of lantern globe called the Lite-Gard has been placed on the market by Detroit Metal Products, Inc., Detroit, Mich. It differs from the earlier styles of lantern globes in that, instead of being made entirely of glass, it consists of a steel housing with three glass bull's-eyes equally spaced around its circumference, so as to give good visibility in all directions, regardless of the position of the lantern. The combination of steel housing with bull's-eye lenses makes it practically indestructible as compared with the all-glass type. Furthermore, the bull's-eye makes the lantern more attention-compelling. This globe fits all standard lanterns using small-size globes.



THE KENTUCKY-TENNESSEE LIGHT & POWER CO.'S SMITH MOTOR COMPRESSOR WORKING ON A ROCK TRENCH

CLEVELAND ADDS WESTINGHOUSE VISIBILITY SYSTEM To Cut Night Traffic Deaths!

The New Cleveland Lake Shore Boulevard after the Westinghouse "visibility system" had been installed. Below is the same thoroughfare before the installation of Reflectolux units.

Reflectolux Jr.—designed for circuits up to 3,500 volts and lamps up to 500 watts or 10,000 lumens.

Cleveland early this year began an intensive traffic safety and accident prevention program which successfully reduced fatalities 50 per cent. However, night traffic deaths were not reduced in ratio to the day fatality reduction — one fatality after another occurred on streets where poor visibility prevailed.

To match night driving visibility with modern driving speeds, a scientifically designed street lighting system with Westinghouse Reflectolux Jr. luminaires was installed along the new Lake Shore Boulevard as the first check against night traffic deaths.

Westinghouse Reflectolux units are designed to provide adequate brightness on the street surface . . . a surface that is in effect a lighted background for every obstruction in the driver's path. It is possible for the driver to see hazards far enough ahead in time to avoid them. Reflectolux offers more light, less maintenance, greater flexibility and durability than any comparable street lighting luminaire.

For complete details, ask your local Westinghouse Lighting Specialist for the book, SAFETY WITH LIGHT. Or, address Westinghouse Electric & Manufacturing Company, Lighting Division, Edgewater Park, Cleveland, Ohio.

WHEN YOU THINK OF *Lighting Equipment* THINK OF

Westinghouse

When you write for that catalog, kindly mention THE AMERICAN CITY.

New Strato-Plane for Aerial Mapping

Talbert Abrams, President, Abrams Aerial Survey Corporation, Lansing, Mich., has announced that a new stratoplane, The Explorer, has been developed by his organization for high-altitude aerial survey work. This particular development means much to cities, for it will now be possible to map an entire city in a single shot from high altitudes, while formerly it was necessary to make many pictures and piece them into mosaic maps to cover the average size city. By flying at high altitudes, taking in a greater area, and still maintaining the detail, Abrams Aerial Survey Corporation will be able to reduce its prices for aerial maps for individual cities.

THE NEW ABRAMS AERIAL PHOTO SHIP "EXPLORER"

Valuable Papers on Asphalt Construction

Five new publications in the Asphalt Institute Construction Series, consisting of compilations of papers presented at the Eleventh National Asphalt Conference, have been made available to readers of THE AMERICAN CITY and will be sent to any interested readers without charge, either upon request to this magazine or direct to The Asphalt Institute, 801 Second Avenue, New York.

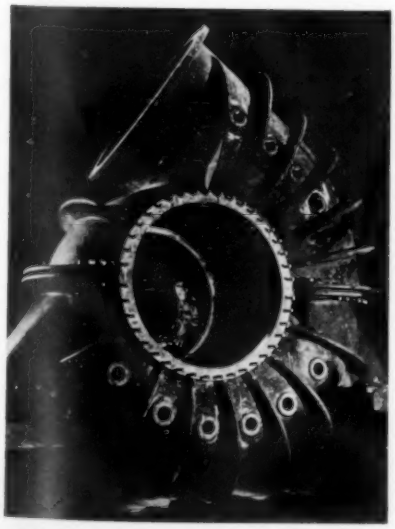
Construction Series No. 40 is a 48-page pamphlet dealing with the subject "Soil Stabilization with Asphalt."

Construction Series No. 41 is a 28-page bulletin on plant mix operations.

Construction Series No. 42 is a 24-page paper discussing the Oregon method of building bituminous macadam, the place of medium curing asphalt products in plant and road-mix construction, and the selection of asphaltic products for various types of surface treatment.

Construction Series No. 43 is a 24-page bulletin on the control of streams and the prevention of erosion through the use of asphalt.

Construction Series No. 44 is a 12-page bulletin on types of asphalt sidewalks for country highways.



MAKING READY FOR A BIG PUMPING JOB

Drilling stud bolt holes for the suction elbow of a huge cast iron centrifugal pumping casing weighing 45,000 pounds for one of four 72-inch double-suction sewage pumps being built by Allis-Chalmers for the Sanitary District of Chicago, Racine Pumping Station

Dual-Purpose Spreader Made in Three Models

A new line of spreaders, to be known as Warco-Hartley spreaders, to be built in three models, has been announced by W. A. Riddell Corporation, Bucyrus, Ohio. Model H is to be the regular type, Model M is of the transmission type and affords eight different speeds, making it possible to operate it up to a speed of 35 miles per hour, and the third type is the Model M transmission type, equipped with an independent motor for driving the disc in spreading exceptionally heavy material such as black top chips.

These spreaders are made so that the width and thickness of the spread can be accurately controlled by the amount, speed and position at which the material is fed to the disc, insuring an even distribution of the material from 6 to 30 feet, depending upon its character. The spreader is designed for use behind a truck traveling on the right-hand side of the road, and discharges material behind and to the left of the truck. The discharge is arranged low enough so as not to interfere with passing traffic. An automatic hitch makes possible quick detaching of the spreader from one truck and changing to another.

In territories where there is the long winter fight against ice or hard-packed snow and slippery pavements, the Warco-Hartley spreader can be used to spread the necessary sand, cinders, calcium chloride or common salt. It may also be used in summer for spreading calcium chloride or other dust-laying materials, for bird's-eye stone or black top chips, and for agricultural lime or fertilizer as well.

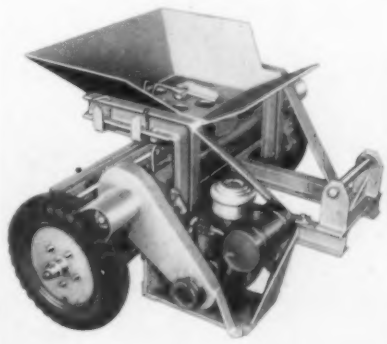
Westinghouse Merges Two Divisions

Consolidation of the Transportation and Generator Divisions of the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., has been announced. Frank Howell Stohr, Manager of the Generator Division since last December, has been named Manager of the combined Transportation and Generator Divisions, with headquarters at East Pittsburgh. Frank B. Powers, formerly Manager of Transportation Engineering, becomes Engineering Manager of the combination.

Paine Announces Firm for Consulting Practice

Clifford E. Paine, formerly associated with the late Joseph B. Strauss in the firm of Strauss & Paine, Inc., and principal assistant engineer of the Golden Gate Bridge during its design and construction, has announced that he will continue his practice of engineering under the name of Clifford E. Paine & Associates, Inc., with principal offices at 176 West Adams Street, Chicago, Ill.

The associates in the company include Charles H. Clarahan, Jr., Dwight N. Wetherell, Richard K. Strauss, and others of the engineering staff.



THE DUAL-PURPOSE WARCO-HARTLEY SPREADER

A Record of Progress

HONOR ROLL

of Cities Relighting Main Traffic Arteries to Save Lives

WILMINGTON
INDEPENDENCE
GREENWOOD
POTTSVILLE
BETHLEHEM

CITY officials everywhere are taking steps to cut down the traffic toll of property damage, injuries, and deaths. Scores of municipalities are doing their part by relighting main thoroughfares to halt the increasing number of night accidents. Here are five of these progressive cities.

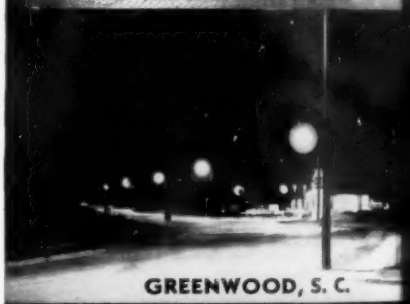
Leading safety authorities have said that by relighting main traffic arteries, cities can save more lives and costly accidents than by almost any other means. This conclusion is not surprising when you consider that a recent night-accident survey of 47 cities showed that main traffic arteries are from 10 to 30 times more dangerous at night than by day.

If your city has not already relighted its thoroughfares, could it make any improvement of greater benefit to the people than a lighting program to reduce night accidents?

G-E lighting specialists will be glad to help you work out an effective street-lighting plan for your traffic arteries. Call or write the nearest G-E office. General Electric, Schenectady, N. Y.

WILMINGTON, DEL.

INDEPENDENCE, IA.


GREENWOOD, S. C.

POTTSVILLE, PA.

GENERAL ELECTRIC

Tractor Official Dies

C. Parker Holt, Vice-President and a Director of Caterpillar Tractor Co., Peoria, Ill., and for nearly 40 years affiliated with it and one of its predecessors, the Holt Manufacturing Co., died on August 24 at his home in Piedmont, Calif. Mr. Holt was born in San Francisco on April 5, 1880, and was the son of Charles H. Holt, who had shortly before come from New England to San Francisco to found there the hardwood lumber business of which the Holt tractor and harvester manufacturing activities were the outgrowth.

Sterling Incinerator Representative Appointed

The C. O. Bartlett & Snow Co., Cleveland, Ohio, has announced the appointment of H. K. Smith, of the Smith Engineering Co., 832 West Fifth Street, Los Angeles, as representative to handle sales of Sterling Furnace refuse incinerators in the states of California, Oregon and Washington.

Traffic Police Belts with Reflector Buttons

It is common practice in many cities to spotlight traffic police who work at night by using an overhead light. It is now possible to protect each individual officer, no matter where he may be working, by means of a belt of the Sam Browne type carrying reflector buttons. The Reflecto Police Belt gives a military dress appearance to any uniform, and this type was chosen to meet the exacting requirements of leading police and traffic authorities. Detachable reflectors on the front, back and sides of the belt, and on the front and back of the shoulder straps, leave no dark spots facing traffic, no matter what position the wearer may be in. Each individual reflector is made up of seven clustered lenses which present a reflective surface at angles up to 50 degrees from the source of light.

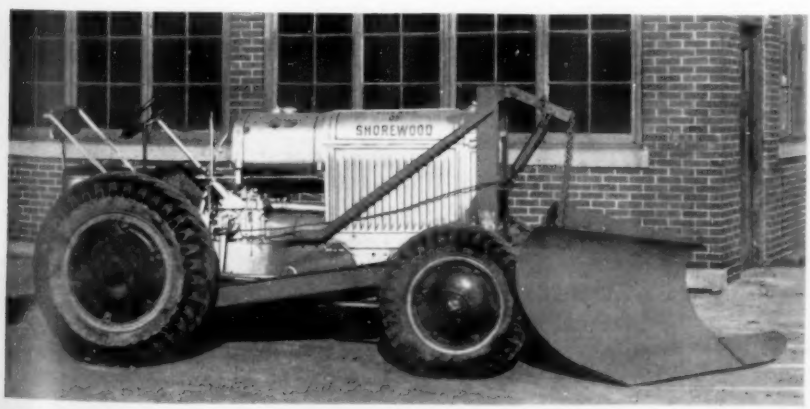
These belts, made by Aeroil Burner Co., Inc., West New York, N. J., are manufactured of the finest Army standard white webbing and are light in weight. Even the twenty-reflector belt weighs less than 2 pounds. They do not interfere in any way with the free movement of the wearer, and the reflecting units are quickly detachable so that the belts may be used in the daytime and may be easily cleaned. All belts are equipped with extra snaps so that more reflectors can be added, and they are adjustable to fit height and belt measurement. The standard color of the reflectors is red, but crystal, amber or green may be supplied on special orders.

A NEW TRAFFIC POLICE BELT WITH REFLECTOR BUTTONS

Sidewalk Snow-Plows

The accompanying illustration shows a typical V-type sidewalk plow built by The Heil Co., Milwaukee, Wis., for the village of Shorewood, Wis. Highway officials make every effort to clear roads immediately following a snowstorm, but this village is interested also in saving its pedestrians from wet feet.

The Heil Co. builds this and other types of sidewalk plows, as well as the Semi-Circle pusher type snow-plows for mounting on the front of trucks. Complete details and further information will be furnished to anyone interested in writing direct to The Heil Co. and mentioning this magazine.



A HEIL SIDEWALK SNOW-PLOW MOUNTED ON AN INTERNATIONAL TRACTOR USED BY THE VILLAGE OF SHOREWOOD, WIS.

$145.20 PER MILE

IS THE LOW COST OF KEEPING YOUR SEWER SYSTEM OPERATING 100% EFFICIENTLY

IF

YOU HAVE AVERAGE CONDITIONS AND USE

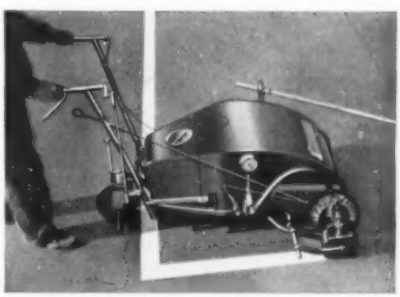
OK CHAMPION SEWER CLEANERS

THESE MACHINES EARN BACK MORE THAN THEIR ORIGINAL COST IN ONE YEAR IN SAVINGS OVER OTHER METHODS.

DROP US A LINE. LET US HELP YOU WITH YOUR SEWER PROBLEMS.

CHAMPION CORPORATION

4716 Sheffield Ave. Hammond, Ind.



M-B STREET MARKER

for All Types of Striping

Compact, self-propelling marking unit adaptable to all kinds of striping jobs, street center lines, parking lines, cross walks, safety zones, etc. Equipped with exhaust blower, adjustable paint box, spray nozzle and guide for marking. It cleans as it sprays as it brushes.

Saves 75% of Marking Costs

Easy, one-man, motorcycle-grip control for painting, steering and speed. No compressor required. Low initial cost. Practically no upkeep. Keeps men from dangerous hand-marking jobs. Reduces insurance premiums. Write for new Street Marker bulletin.

Meili-Blumberg Corp.
Box A-10
New Holstein, Wisconsin

Quickly attachable hand gun for various paint spraying jobs.

MB MEILI-BLUMBERG

WHO IS UNION METAL?

The Union Metal Manufacturing Company was founded over 32 years ago in the belief that many products, both then and in the future, could be built better with steel. Continued adherence to this belief has resulted in the development of a varied line of steel products which, today, have nation-wide acceptance and use.

In 1906 Union Metal introduced and popularized the use of steel columns for homes and buildings. Later it developed the tapered, fluted steel lighting standard which for years has been considered an integral part of modern street lighting systems, both here and abroad. Steel standards for traffic signals, signs, bridge, highway, floodlighting—steel power distribution poles, and the Fluted Monotube pile have since been added with equal success.

When you specify "Union Metal" you are assured of a quality product, engineered to your specific needs and backed by a dependable, firmly-established company—one that has continuously maintained and strengthened its leadership in this specialized field by virtue of sound manufacturing and merchandising policies.

THE UNION METAL MANUFACTURING CO., CANTON, OHIO

BRANCH OFFICES: NEW YORK • CHICAGO • BOSTON • BALTIMORE • ATLANTA • SAN FRANCISCO • LOS ANGELES

Outdoor Lighting

A Section of THE AMERICAN CITY
Devoted to the Lighting of Streets, Highways, Bridges, Airports, Athletic Fields and Parks and the Floodlighting of Public Buildings

Modernized Street Lighting in Hartford

By K. L. PARTRIDGE
Distribution Engineer, The Hartford (Conn.) Electric Light Co.

THE City Administration of Hartford, with the cooperation of the Hartford Electric Light Co., has adopted a relighting program as a means toward making Hartford a more comfortable and safe place in which to live. This progressive plan has been carried through in the 1937-38 street-lighting program. The accompanying map shows a number of streets which were considered to be inadequately lighted for modern traffic demands. These streets were selected in accordance with the complete plan to provide adequate lighting as rapidly as possible for all streets. During 1937 new systems were installed along these streets.

The old lighting was largely overhead mast-arm constructions with lamp sizes varying from 2,500 lumens to 10,000 lumens. Although the larger lamps were used in many luminaires, the lighting was not sufficient for safe conditions. In most cases the spacing was very wide, with resultant dark areas between luminaires. The new systems were planned to eliminate this condition.

In planning the new installations, a minimum lamp size of 4,000 lumens was adopted. On the more important streets 6,000 and 10,000 lumens were used. In every case the units are staggered to make the illumination uniform on both sides of the street. Luminaires are pendent type hung on long brackets.

All new purchases of fixtures are General Electric Co. Form 79-R with Holophane Lateral B-SYM-ETRIC Refractor. Although the reflector-refractor luminaires must be spaced somewhat closer together than bowl-type refractors, these important streets justify this spacing. The increased efficiency of the refractor type permits the use of lamps of 4,000 and 6,000 lumens instead of 10,000 lumens.

	Street Width Feet	Street Length Feet	Average Spacing Feet	Number and Candlepower New Lighting (Form 79-R)	Old Lighting
1.	44	3,400	110	31–600 cp	17–600 cp†
2.	36	2,600	137	18–600	10–250
3.	40	5,700	126	45–600	22–1000† 1–1200‡
4.	40–48	7,600	101	75–600	32–1000†
5.	40	1,600	133	12–1000*	3–600† 3–250
6.	40	5,300	110	48–600	13–600‡ 10–600† 4–1000†
7.	40	2,500	140	16–600*	9–250
8.	40	3,300	132	25–600*	9–600† 2–250
9.	40	3,500	110	32–600	17–1000†
10.	30	1,300	108	12–600	6–1000†
11.	38	5,800	160	36–400	25–250
12.	52	6,300	123	51–600*	23–1000†
13.	46	2,200	110	20–600	9–1000*
14.	25	1,800	120	15–600*	7–1000†
		52,900		436	222

*Form 32 bracket.
†Mast-arm unit. ‡Ornamental post.

In each installation the luminaires were mounted 22½ feet to light center. All the lamps operate from a series circuit with IL transformers. The transformer secondaries provide 20 amperes for the 6,000-lumen and 10,000-lumen lamps, and 15 amperes for the 4,000-lumen lamps.

Since relighting, the accident rate on these 14 streets has been cut 50%.

STREETS MARKED IN HEAVY BLACK ON THE HARTFORD MAP HAVE BEEN RELIGHTED, WITH THE TYPICAL RESULT SHOWN IN THE NIGHT VIEW OF NEW BRITAIN AVENUE

For a full analysis of results in accident reduction, see page 55 of this issue

Modern Street Lighting Reduces Accidents

By L. A. S. WOOD
Chief Lighting Engineer, Westinghouse Electric & Mfg. Co., Cleveland, Ohio

THE White Way era in the United States ended with the advent of the depression, and since then an entirely new conception of street lighting has grown up which is leading to a more generous use of electrical energy and a greater degree of traffic safety.

A recent survey of 47 American cities with a total population of 19,000,000 showed that the most dangerous streets are the main traffic thoroughfares which, although representing barely 10 per cent of the total street mileage, accounted for 77 per cent of the total traffic fatalities, of which 69 per cent occurred at night. The residential streets accounted for most of the other fatalities.

Last year (1937) 39,700 persons were killed by automobiles in the United States and, of these, nearly 25,000 lost their lives during the hours of darkness as compared with 15,000 killed during daylight.

Match Speed with Visibility

Speed and visibility are complementary factors in traffic safety, and a substantial reduction in speed at night, or an increase in night visibility, would undoubtedly be accompanied by a reduction in traffic accidents.

Speed studies show that at 20 miles per hour, a car with brakes in average condition cannot be brought to a stop on a dry road in less than 52 feet. At 40 miles per hour, the stopping distance is 164 feet, while at 60 miles per hour, it is 330 feet. In wet weather, when visibility at night under existing lighting conditions is reduced, stopping distance is nearly doubled. Statistics also show that automobile fatalities increase with speed. At 20 miles per hour, one accident in 61 is fatal, but at 60 miles per hour, one in 11 is fatal.

This suggests a new approach to the problem of street lighting, namely, "Safety Through Adequate Visibility," or in other words, "Matching Visibility with Speed."

This can be accomplished either by flooding the streets at night with light as in White Ways, where discernment of direct illumination is possible, or by the less expensive and more effective method of rendering the surface of the road bright so that objects may be discerned as silhouettes against the bright background of the pavement beyond.

New Luminaires

The modern luminaire consists essentially of an extended hemispherical aluminum reflector finished by the Alzak process, equipped with a "deformed" pear-shaped globe. The light source is located within the reflector, completely shielded from the eye of the observer. The distribution of this unit is symmetrical and it is installed at a spacing of approximately three times the mounting height.

Asymmetric distribution, suitable for a spacing of five times the mounting height, is obtained by locating supplementary reflectors within the globe on the house side, rigidly attached to the main reflector. These supplementary reflectors direct the light flux up and down the street at grazing angles to produce brightness for the automobile driver and at the same time shield the buildings from undesirable light emission.

For locations where wider spacings are desirable, lateral distribution is attained by substituting a specially designed one-piece Holophane refractor for the pear-shaped globe. In this combination, the prisms are so designed as to reduce the surface brightness of the refractor to a minimum. A spacing of eight times the mounting height is permissible with this luminaire.

The new luminaires are made in two sizes, the smaller to accommodate lamps up to 10,000 lumens (1,000 candlepower) series, or 500 watts multiple, and the larger for lamps up to 15,000 lumens (1,500 candlepower) series, or 750 watts multiple.

In order that the light reflected from the road surface shall be directed toward the driver, it is necessary that the new luminaires be mounted out over the roadway, and suitable lighting standards have been developed which locate them approximately 4 feet over the roadway and from 20 to 25 feet above its surface in accordance with the spacing-mounting-height ratio for which the luminaires are designed.

Many installations of the new equipment have been made in the United States in the past three years, but the most significant results have been obtained in Detroit, Mich., where accurate accident records have been kept before and after modernization.

Proof of Effectiveness

In Detroit it was found that most of the fatalities were occurring on 31 miles of main thoroughfares where the ratio of night to day fatalities was in the order of 7 to 1. Supported by a $3,000,000 appropriation, L. J. Schrenk, General Superintendent of Detroit's Lighting Commission, started in the latter part of 1936 to modernize the lighting on these thoroughfares. In 1936, the night fatalities on these thoroughfares were 35, and the day fatalities 5. In the first ten months of 1937, under the new lighting system, the night fatalities were reduced to 6 and the day fatalities remained at 5, or a ratio of 1.2 to 1.

Street-Lighting Unit Costs

THE accompanying tabulated street-lighting costs in 17 big cities are as of 1935 and are taken from and based on a report made for the District of Columbia and abstracted in THE AMERICAN CITY of August, 1937. The unit costs are (1) per capita, (2) per foot of lighted street, (3) per lighting unit, and (4) per square mile.

The closest agreement among the cities is in the cost per lighting unit, varying from $14.39 in Seattle where municipal power is available, and $17.89 in St. Louis, to $45.49 in Minneapolis.

On the familiar per-capita basis, costs range from 59 cents in Buffalo to $2.36 in Rochester. The cost per foot ranges from 10.2 cents in New Orleans and 10.6 cents in Pittsburgh, to 36.5 cents in Rochester and 48.5 cents in Seattle.

UNIT COSTS OF STREET LIGHTING IN 17 CITIES

	Per Capita	Per Foot	Per Unit	Per Square Mile
Baltimore	$1.50	$0.254	$33.49	$16,190
Boston	1.19	.192	42.86	22,666
Buffalo	.59	.202	35.61	18,010
Cincinnati	1.23	.156	33.27	7,613
Cleveland	1.20	.186	42.49	14,244
Indianapolis	.87	.103	38.34	6,612
Jersey City	.96	.271	67.07	22,308
Kansas City	1.47	.157	44.28	11,272
Minneapolis	.73	.078	45.49	6,963
Milwaukee	.59	.197	20.74	8,172
Newark, N. J.	.86	.220	57.13	23,433
New Orleans	.82	.102	42.12	1,878
Pittsburgh	1.16	.106	41.60	14,564
Rochester, N. Y.	2.36	.365	43.89	24,810
Saint Louis	1.02	.165	17.89	13,561
Seattle	1.04	.485	14.39	5,474
Average 16 cities	1.13	.150	38.79	15,529
District of Columbia	1.23	.266	24.24	11,759

Street-lighting costs in 1937 have been gathered by THE AMERICAN CITY for about 100 cities of 30,000 population or more. Total and per-capita costs and the costs per mile and per foot of lighted streets will soon be published, with estimated populations, in 1929 and 1938, and miles of public streets now lighted.

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The American City

NOV 14 1938

2 modern street cars or super coaches or 3 trolley coaches or large buses or 6 small buses could carry all the people in the 82 automobiles that are crowding this street. See page 43.